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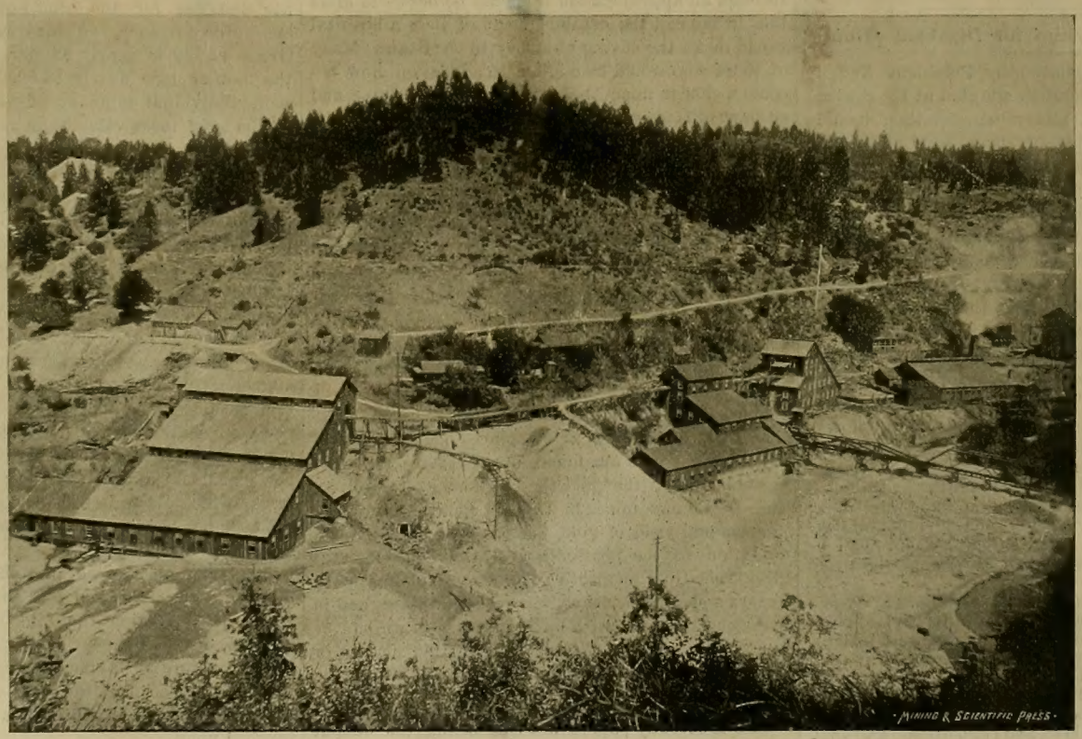
AND PACIFIC ELECTRICAL REVIEW.

No. 1904.—VOLUME LXXIV. Number 1. SAN FRANCISCO, SATURDAY, JANUARY 2, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Champion Mine at Nevada City.

The Champion Mining Company's properties near Nevada City are typical of the best class of large, well equipped and well managed California mines. The illustration on this page shows the works on the surface, which include the new 40-stamp mill on the Wyoming ground (shown on the left), the old 30-stamp mill, chlorination works, Merrifield hoist and office. A 10-stamp mill on the Spanish mine is also included in the works, but not shown in the cut. The capacity of these three mills, with their 80 stamps, is about 5800 tons per month.

The property was taken hold of a number of years ago by the present company, composed of San Francisco capitalists, and under the direction of Fred Zeitler it has been built up into one of the largest mining properties in Nevada county. There was, when they took charge, a 10-stamp mill and a small hoisting and pumping rig on the mine. Twenty stamps were added to the old mill, and chlorination works built with a capacity of four tons daily. The old shaft was enlarged 5½ x 15 feet, with three compartments, and has been since sunk to a depth of 1700 feet. A new hoisting plant, capable of sinking 3000 feet, was put in. This plant is equipped with a double friction hoist, geared separately and having separate motive power. There is connected with this a pumping plant capable of handling all the water of the mine. There are five pumps operated from this.



WORKS OF THE CHAMPION MINING COMPANY, NEAR NEVADA CITY, CALIFORNIA.

There are twenty-six drifts, thirteen on each side of the shaft, 100 feet apart to the 1000-foot level, and 200 feet apart to the 1600. These in length are from 300 to 1600 feet each. The property is lighted by an electric plant. Large ore bodies are being stoped from the main shaft from the 1000 to 1200-foot level. A new 5x8 shaft has been started on the Merrifield ground, and is now down over 400 feet. There are twenty-three claims owned by the company, including the Wyoming and Merrifield.

For several weeks past the mining experts, Bratnober, Wartenweiler and Browne have been making an examination of the Champion company's property on behalf of the Exploration Company of London, who are contemplating its purchase. The property has attracted the attention of foreign capitalists for several years, but so far they have failed to secure it.

Mining Legislation.

The Committee on Legislation of the California Miners' Association, which has in hand the proposed bills for presentation to the State Legislature, has, after careful revision, had them printed and copies forwarded to the members of the Legislature.

These proposed bills in their original form were proposed by the MINING AND SCIENTIFIC PRESS and published in the issues of October 31st and November 7th. They were later endorsed by the Miners' Association in November, and since that time have been carefully gone over by Chairman A. H. Ricketts and the other members of the committee. Some valuable changes and additions have been suggested by leading authorities, and it is believed by the committee that their passage will be of great value to the mining industry.

Their adoption can injuriously affect no interests and will be the cause of no extra expense on the part of the State. The necessity for the adoption of such laws has long been admitted on all hands. So well impressed is the Governor with their value that he will recommend in his message next week that they be passed.

There could not be a better time than the present to urge some legislation looking toward a thorough investigation on the part of the State of the questions involved in the deposit debris from the hydraulic mines with a view to reopening them. The Anti-Debris Association should be willing to cooperate in this matter. They must have learned by this time that a great deal more debris comes down from the mountains from other causes than ever came from the hydraulic mines. This debris promises to give them trouble. It cannot be stopped unless the mountains are deserted of all the settlers. The time is coming very soon when a system of dredging out of the streams these deposits must be undertaken by the State. Then, probably, the people of the valleys will be only too glad to allow the hydraulic mines to be reopened if the owners will pay for keeping the streams dredged.

THE reopening of the old Gwin mine in Calaveras county is an event worthy of special note. It has what is claimed to be the largest pay chute in the State, some 1300 feet in length. For sixtee years, the property which had produced a large amount of bullion, had laid idle until two years ago. Thomas, Belshaw, McClure and Voorheis, all miners, took hold of it under a bond for $200,000. Over $150,000 has been expended on sinking a 1500-foot shaft, and putting up a 40-stamp mill. But for the better knowledge now possessed of the value of mines in the district in depth and the reductions made in late years in the cost of mines and milling, this work would not have been undertaken. Within a few miles of the Gwin, in Calaveras and Amador, are other mines upon which similar work is being done, and the amount that has been or will be expended to open up about a dozen large properties before a ton of ore is crushed will aggregate nearly $2,000,000. This says much for the faith of mining men in the permanency of the ore bodies of the mother lode. Many of these mines are old properties that were worked years ago, but were closed down owing to the crude methods and expenses of working that prevented profits being made under the difficulties that arose. In nearly all other parts of the world where there has been recently great activity in gold mining it has been caused by the discovery of entirely new gold fields. But in California practically all the increase in mining has been in old camps where mining has been carried on for over forty years.

THE output of gold for 1896 in the different gold fields is a question that is puzzling many who are trying to guess ahead of the reports of the statisticians. That of South Dakota is already known and was an increase of about 25 per cent over 1895. Colorado, after all, will probably fall short, according to the Denver *Republican*, although the Cripple Creek yield will show an increase.

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J. F. HALLORAN.....General Manager

San Francisco, January 2, 1897.

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A Hospital and Asylum for Disabled Miners.

There has been appointed by President Neff, in accordance with a resolution adopted at the convention of the California Miners' Association, held in November, a committee of three to consider and report upon the subject of a hospital for disabled miners. It is important that the committee should lose no time in devising some plan for carrying out the idea of the convention, for, unless something is done soon in order to bring the matter before the State Legislature at its coming session, whatever assistance may be required from the State cannot be obtained for two years more.

There was passed by the Legislature a bill, approved by the Governor March 14, 1881, and now on the statute entitled "An Act to Provide a State Hospital and Asylum for Miners," which is as follows :

SECTION 1. There shall be erected, as soon as conveniently may be, upon some suitable site, to be determined and obtained as is hereinafter provided, a public hospital and asylum, for the reception, care, medical and surgical treatment and relief of the sick, injured, disabled and aged miners, which shall be known as the "California State Miners' Hospital and Asylum."

SEC. 2. The Governor shall nominate, and by and with the advice and consent of the Senate, appoint five persons to serve as trustees of the said institution, who shall be a body politic and corporate, by the name and style of the "Trustees of the California State Miners' Hospital and Asylum," and shall manage and direct the concerns of the institution, and make all necessary by-laws and regulations, and shall have power to receive, hold, dispose of and convey all real and personal property conveyed to them by gift, devise, or otherwise, for the use of said institution, and shall serve without compensation. Of those first appointed, two shall serve for two years, and three for four years; and, at the expiration of the respective terms, each class thereafter shall be appointed for four years. A vacancy in said Board, from any cause, shall be filled by appointment by the Governor for the unexpired term.

SEC. 3. The said trustees shall have charge of the general interests of the institution; they shall appoint the superintendent, who shall be a skillful physician and surgeon, subject to removal or reelection no oftener than in periods of ten years, except by infidelity to the trust reposed in him, or for incompetency.

SEC. 4. The trustees, by and with the consent of the Governor, shall make such by-laws and regulations for the government of the institution as shall be necessary; they shall appoint a treasurer, who shall give bonds to the people of the State of California for the faithful discharge of his duties; and they shall fix the compensation of all officers, assistants and attaches, who may be necessary for the just and economical administration of the affairs of said institution.

SEC. 5. Indigent miners shall be charged for medical attendance, surgical operations, board and nursing while residents in the hospital and asylum no more than the actual cost; paying patients, whose friends can pay their expenses, and who are not chargeable upon townships and counties, shall pay according to the terms dictated by the trustees.

SEC. 6. The several Boards of Supervisors of counties, or any constituted authority in the State having care and charge of any indigent, sick or aged person, or persons, if satisfactorily proven by them to have been miners, shall have authority to send to the "California State Miners' Hospital and Asylum" such persons, and they shall be severally chargeable with the expenses of the care, maintenance, and treatment, and removal to and from the hospital and asylum, of such patients.

SEC. 7. The trustees shall, annually, as such time as the Governor may designate, report to him, for transmission to the Legislature, such a statement as he may require as to the management of the said hospital and asylum.

SEC. 8. This Act shall take effect immediately.

Since the passage of this statute no appropriation has been made by the Legislature for carrying its provisions into effect. The fact that it is in the statute books relieves the Miners' Association committee of much work it would otherwise have to do.

It is not probable that the State will be asked to contribute very largely in any case. The liberality of the men employed in the mining industry is proverbial, and there can be little doubt that if the State will make some provision for starting the proposed hospital, large bequests would be made. This would certainly be the case if it were once started and put under responsible management that would commend it to the countenance of the Miners' Association.

In considering the question of cost to the State through an appropriation it should be borne in mind that in the end the establishment of such a hospital would mean the saving of money to the State. Many of those who would be eligible to admission now become a charge upon the counties and the State and no part of this expense is paid by private individuals. If a miners' hospital and asylum is established it would be in large part supported, no doubt, by the miners and mine owners. It is to be hoped that the committee will act in time to obtain the co-operation of the Legislature this year.

THE large amount of activity in opening up gold mines in Nevada the past year has led to the question whether Nevada, after all, is more of a silver than gold State. In this connection, Dan de Quille writes that nowhere in Nevada are there any big silver mines—not a mine that will yield the silver that was at one time produced by the second-class Comstock mines. In a few places small veins of milling silver ores are found, but these are generally as valuable for the gold they contain as the silver. The De Lamar mines in Lincoln county, with their phenomenal yield of gold, has done much to attract attention to the possibilities of the State in that direction. Gold properties are being exploited, both quartz and gravel, nearly all over the State, and in many cases by men with large means. It will not be idle to predict that Nevada will, within a year or two, take high rank among the States as a gold producer.

THE Kootenay papers are estimating the output of gold in the district for 1896. At the beginning of the year it was claimed by many that it would reach $10,000,000. Although it will not be over half that, no new district has made a better showing. A very small proportion of the work done was on producing mines, and the development work has proven so many properties of value that a good future is guaranteed. It is estimated that machinery to the value of $1,000,000 has gone into the district during the year. This and the building of railroads and smelters give indication that capital has been inspired with confidence. A large proportion of the ore discovered in the paying mines, while of too low grade to work, now will in a short time as the rates of shipping and smelting are reduced yield good profits.

THE old pocket mines on Bald mountain in Tuolumne county that have in the past yielded largely are now being reopened and worked more than they have been for many years. A pocket miner has an instinct for finding the rich spots that puzzles and surprises the best of miners in other classes of mining. He sees signs of approach to the objects of his quest that would mean nothing to the geologist who has made a study of quartz veins. The capital required is small and the profits often large.

Progress in the Reduction of Gold Ores.

Improvements in mining and milling gold ores are in no better way indicated than in the reduction of working costs per ton. This progress toward cheaper production has made profitable the working of lower grade ores and a consequent widening of the field of mining operations. Properties considered of no value twenty years ago are now producing good dividends upon ores of no better grade than were then in sight. Should this progress continue, ore now of too low grade to work at a profit will become of value.

In comparing working costs, sight must not be lost of the different conditions under which different mines operate. Reduction of ore for $6.00 per ton in one mine may indicate more careful management than at $4.00 in its near neighbor. Difference of cost in different mines cannot be compared to as much advantage as the record of one individual mine over several consecutive years.

The general tendency of working costs is to increase with the life of the mine, if no improvements in methods or machinery are introduced, for hoisting must be done from greater depths or longer tunnels run, a greater length of openings kept in repair, more water pumped and more timbering resorted to. So that a decrease in cost per ton means that greater skill and improvement have been instituted than the financial results show, for they are made in the face of increasing difficulties.

In general, it may be said that the working costs of one mine indicate the costs throughout the immediate district, for the conditions are locally similar. For instance, we may say that the cost at Grass Valley is nearly $8 per ton and that along the mother lode nearly $4.50. But the record of some individual mine or of several mines in one region is of more value than any number of general statements.

The oft published results of working costs are very elusive facts. In considering the cost of production per ton the only real indication lies in the actual difference between bullion produced and dividends paid. Property or machinery purchased adds in a very small proportion to the value of the plant. The life of a mine is short, at best not over fifteen years and in the end the plant is of little value. Very often working costs are given not including general management, legal expense and especially construction accounts. A mine which produces $1,000,000 per year in bullion and pays $100,000 per year in dividends with an annual investment of $100,000 in new machinery during its career is not as good a mine as one which produces $250,000 per year in bullion and $150,000 per year in dividends, although it seems to be popularly considered so.

The fact that the yield per ton given in the following table decreases from year to year is not necessarily an indication that the grade of the ore decreased, but that the lower cost of production permitted of working a larger proportion of the ore found and consequent lowering of the average per ton. The data well illustrates some of the points touched upon.

MURCHIE MINE, NEVADA CITY DISTRICT.

YEAR.	Tons of Ore Produced.	Tons of Sulphurets Produced.	Bullion Produced.	Value Per Ton.	Cost of Mining Per Ton.	Cost of Milling Per Ton.	Total Cost Per Ton.	Profit Per Ton.
1878	6,332	263	$ 80,191	$12.66	$7.15	$2.10	$9.25	$5.51
1879	10,103	528	169,104	16.73	6.93	1.89	8.82	7.91
1880	5,924	254	76,143	12.85	6.85	1.52	8.37	4.40
1881	3,505	150	61,887	17.65	6.19	1.67	7.86	9.79
1882	6,240	240	99,305	15.91	5.88	1.57	7.45	8.46
1883	6,372	276	100,443	15.77	5.41	1.52	6.93	8.84

HITE MINE, MARIPOSA COUNTY.

YEAR.	Carloads produced	Bullion Produced.	Cost Per Carload.	Yield Per Carload	Profit Per Car.
1872	3,024	133,782	$14.15	$44.24	$30.09
1873	3,716	136,125	14.42	36.63	22.21
1874	4,522	157,080	10.69	34.73	24.04
1875	4,338	143,005	12.07	32.73	20.66
1876	9,312	241,000	8.86	25.88	17.02
1877	15,750	239,679	6.27	15.22	8.95
1878 (6 months)	6,868	127,941	5.10	18.63	13.53

The carloads here given weigh from 1600 to 1800 pounds.

Concentrates.

THERE are sixty shipping mines in the Slocan district, British Columbia.

AT Grand Forks, B. C., the price of town lots jumped from $150 to $500 in a week lately.

THERE was distributed one day last week in Salt Lake $82,500 in dividends from four mines.

THE Tucson *Star* claims that the gold output of Arizona for 1896 will prove to be not less than $10,000,000.

THE output of the De Lamar mines, Lincoln Co., Nevada, for 1896 is estimated at between $2,000,000 and $3,000,000.

THE gold product of the Rand district, South Africa, for November, '96, was 201,000 ounces; Nov. '95, 195,000 ounces.

SENATOR TELLER characterizes as "all buncombe" the allegation that the new tariff bill would provide for a duty on silver.

THROUGH passenger trains were put on between Rossland and Spokane for the first time over the Red Mountain road last week.

JAMES F. WARDNER has obtained the franchises and other plants of the Rossland Water & Light Company for Montreal capitalists.

A DISCOVERY of telluride ore has been made in the Jumbo mine at Rossland, British Columbia. This is the first found in the district.

THE La Campana Mining Company, whose headquarters are at Tucson, Arizona, are contemplating the erection of a 50-stamp mill on their mine in Sonora, Mexico.

THE manager of the Niagara Mining Company at Bingham, Utah, has added $60,000 to its profits during the past year from milling of lower grade ores than was possible before.

AN order has been issued from the office of the United Verde Copper Company in Arizona that every man in their employ whose wages are garnisheed for debt will be discharged at once.

THE New South Wales geologist reports that from the Falkness mine 555 tons of ore yielded 6534 ounces in gold. From this the net proceeds were $115,000 after paying all expenses.

IN Placer county, Cal., a new five-stamp mill has been completed for the Marguerite mine and plans have been made in putting up twenty stamps on the Gold Blossom mine near Ophir, Cal.

SEVERAL of the men charged with kidnapping Superintendent Meikle of the Garnet Consolidated mine in Sierra county for hiring Chinese, have been arrested and held for trial before the Superior Court.

THE DeLamar Company in Pioche, Nevada, is considering the feasibility of purchasing the Ash Springs water at Pahranagat valley and erecting an electric plant for running its hoists and mills at the mines.

AN option on 50,000 shares of stock in the Elkton, a Cripple Creek property, for $50,000 has been taken up by French capitalists. They had already taken up 50,000 and have an option on 50,000 further, making half the stock in the company.

SOME Denver people are considering a project for building a big smelter at Rossland, B. C. If they do so this will make three smelters projected in the neighborhood within a year, the new Hall mines smelter, the proposed Northport smelter being the other two.

WILLIAM PRITCHARD MORGAN, a Welsh member of the British Parliament, who some ten years ago became interested in developing and working some gold deposits in Wales, is on his way to China, where he goes in the interests of an English syndicate seeking investments.

AS some of our readers missed their last issue of '96 containing the index for the preceding six months, it is reprinted herein. It shows the contents of this journal for the last six months of '96. The most casual notice of what it contains shows how completely the field is covered.

THE Calumet & Hecla Mining Company of Michigan is preparing to sink a new shaft to open up the Osceola amygdaloid, a copper vein entirely distinct from the Calumet conglomerate from which the mine has paid over $47,000,000 in dividends. Three new shafts will be sunk on the amygdaloid.

THE Currie and other claims on the Galena Farm, near New Denver, B. C., being operated by the Vancouver and British Columbia Exploration Company, have been stocked in England for $2,500,000. When the shares were offered a few days ago applications for three times the amount of stock were made.

THE London *Economist* says that ten representative South African mining companies have experienced a loss from the highest point in the year of $173,000,000. Ten companies of "Kangaroos" show a depreciation of $23,820,000; for the twenty companies referred to the depreciation has been $196,820,000.

TWENTY years ago the milling for Pioche, Nev., a dry camp, was done at Bullionville, twelve miles away, a narrow gauge road connecting the two. The Phœnix Reduction Company is now experimenting with the cyanide process on the tailings, with a degree of success that warrants the belief of ultimate profit.

AT the Thistle Shaft gravel mine, near Gibsonville, Sierra Co., Cal., this week a flow of water was struck that could not be handled by the pumps. Some of the men escaped with difficulty. This mine has for a long time employed a large number of men. It is owned by a Scotch company, and has been a steady producer for years.

SOME of the best mining properties of California are passing under complete control and ownership of foreign corporations. So much has been said and sung about this through the years that, were anything added now, what was good would not be new and what was new would not be good. At present the tendency is more than ordinarily noticeable.

A TEAMSTER who has taken a contract for hauling the freight from Elko to the Gold Creek mines in Elko county, Nevada, will put twenty-five teams on the road. There promises to be a larger proportionate increase of activity all over Nevada during the year than in any other State, largely owing to the developments going on in the gold properties.

SAYS James A. Pollock, of Salt Lake City: "Utah's listed mining stocks made a splendid dividend record during 1896, the total paid being $2,384,500, the individual companies paying from 12 to 50 per cent on the average market value of their stocks. With the 1896 payments the total dividends paid by the listed stocks reached the sum of $32,368,500."

IT is announced that Mackay and Flood will in a few weeks begin pumping out the Allison Ranch mine, at Grass Valley. The property paid well until 1868, when a heavy flow of water was tapped and the mine flooded. Owing to the large flow of water, it will be an expensive undertaking to pump down to the bottom, and will take over a year's time.

ARRANGEMENTS are being made to increase the plant of the Alaska-Treadwell mines in Alaska. Robert Duncan Jr., the superintendent, is in San Francisco to order the necessary machinery. A four-compartment shaft and a 500-horse power compressor are proposed. The open work is to be supplemented by underground operations—a new phase in this famous property.

IT is claimed that some of the leads that have done so much for Rossland cross the boundary into the Colville reservation in the State of Washington. This is true of the districts along the international boundary. South of Rossland, in Grouse mountain, some claims, it is asserted, are divided by the boundary. There is likely to be considerable done in the reservation in the spring.

THE Comstock, Nevada, lode affords one of the greatest contrasts in the history of a great mining locality. Reference to our files shows that twenty-two years ago to-day, (Jan. 2, 1875), the lode was selling at a valuation of over $100,000,000, Con. Va., $560, California, $480 per share, and other stocks in proportion. The whole lode, at present quotations, is selling for less than $2,000,000. It would be a good buy at that figure.

SUIT has been brought in Connecticut by the Empire Mining and Milling Company of Maine against the Tombstone Mining and Milling Company of Hartford, Conn., for $350,000. The two companies own adjoining mining properties in Arizona, and it is alleged the defendants agreed to open the property of the plaintiff for $10,000, and that the defendant company in opening the plaintiff's property sold $250,000 worth of ore.

IN 1895 there was exported from Canada 8275 tons of asbestos, while the total product of the United States was only 1010 tons, mostly from Georgia. Much of the mica used in the United States also came from Canada. It is claimed that both these minera's abound in the Black Hills, South Dakota, the mica in the vicinity of Custer City and the asbestos in nearly every district, and only await capital to develop.

NEVADA has never been known as a coal producer, but of late several discoveries have been made. The Nevada Central Railway company has eight men at work on a coal mine near Crum Canyon, near Battle Mountain, and the prospects are favorable for the development of extensive coal beds. In Esmeralda county, not far from Columbus, coal mines have been discovered and the coal is being used at Columbus and Candelaria for domestic purposes.

THE Argentine mines, South America, during the past year yielded, silver, 1,042,4920 pounds; gold, 22,462 pounds; and of copper 857,780 pounds, most of which was shipped to France, Germany, England, Belgium and Italy. The director of the Department of Mines and Geology gives it as his opinion that these figures are an underestimate. New and profitable mines are being located in many parts of the Andes and a renewed interest in mining displayed.

A BILL has been introduced in Congress by Representative Mondell, of Wyoming, to authorize the entry and patenting of lands containing petroleum or other mineral oils, under the placer mining laws of the United States. The bill provides that, in making application for the patenting of such lands under these laws, one bona fide discovery of petroleum or other mineral oil shall be deemed sufficient on any tract not exceeding 160 acres held by one individual or association.

A BILL proposed at the last session of the Colorado legislature that failed of passage is to be again introduced empowering a court, upon proper application, to order the sale of a mine when the owners fail to agree as to the best methods of operating the property. There was formerly such a bill in the statute books but it was repealed. Under the law as it now stands, if nine of the members of a mining company decide to make an assessment and go on with work the tenth member may refuse and block progress.

THE Pacific Coast Mining Agency has been formed in this city, with offices at 320 Sansome street, to act as agents for owners, sellers or purchasers of mining property on this coast, in connection with the management, sale or purchase of such property. Horatio Beveridge is the manager. It is the belief of many who have given thought to the subject that a responsible and trustworthy company of that kind is a necessity, and that, by due regard to present requirements, the new organization can insure itself honorable and continued existence.

NEARLY the entire edition of last week's issue of this paper was caught in the mailing room when the fire broke out on Commercial street in this city Dec. 25th, and was totally destroyed. Twenty-four hours after the whole paper was reset, printed and bound, and by night was in the post office ready for transmission to all parts of the world, one of the biggest and quickest pieces of work in the history of San Francisco journalism. For the success of the effort considerable credit is due John Young, the foreman of the MINING AND SCIENTIFIC PRESS printing office.

IT has been mentioned in several papers that the dredging of the Carson river was a failure and that the company was to be reorganized and the river flumed. The manager of the company states that there is no truth in this and that the dredging plant is a success as far as dredging the material is concerned. What has been an obstacle is to save the value in the material after it is taken from the river. To do this the company put an extensive concentrating plant to catch the sulphurets, and it has quite a lot of them on hand. To work these a leaching or cyanide plant will have to be put up and this is what the company proposes to do.

PROMINENT place in prominent newspapers is now being given an advertisement telling what big wages miners can get in South Africa. The advertisement says it is "furnished by leading mining companies." Of course transportation companies interested in carrying miners to South Africa have nothing to do with the announcement. As has been previously pointed out, such advertisements are to be discounted; no one should place much belief in them. No miner should think of going to South Africa unless thoroughly assured of work, that is, unless he knows just where he is going, at what wages and is fairly certain of his pay. To heed such speciously worded advertisements as those referred to would be to invite distress.

THE smelting industry in Utah is described as in a demoralized condition, due to keen competition, not only among the plants in that State, but those outside. A large amount of lead has been shipped out of the State in ores, and also considerable quantities of silicious ores. Freight is paid in cases on as high as 80 per cent of earthy matter in the ores to distant points. The exportation of lead in ores, as compared with bullion, reached its maximum in 1892, when it stood thus: Lead shipped as bullion, 47,552,010 pounds; lead shipped in ores, 43,565,097 pounds. In 1895 there was lead shipped as bullion, 36,326,549 pounds; lead shipped in ores, 34,455,700 pounds. The smelting works of Utah are introducing economical appliances of all kinds to meet the strife.

THE Committee on Legislation of the California Miners' Association has prepared a bill for presentation to the Legislature, to amend the act of 1893, creating the office of State Debris Commisssioner, and appropriating $250,000 for the construction of restraining barriers, so as to make the appropriation available. Its passage will be recommended by the Governor in his message. It extends the office of the State Debris Commissioner for four years from January 1, 1898, in order that the duties for which it was designed may be fulfilled, and excepts the salary of $300 a month, and that of the Secretary of the commission from authorization by the State Board of Examiners previous to payment. The remainder of the bill is intended to bring the requirements of the State and Federal appropriations into accord.

DURING 1896 more than 12,000,000 acres of public lands have been patented to the Northern Pacific railroad, the general land office having practically surrendered itself to this corporation. It appears that the Northern Pacific obtained four-fifths of all the land patented during the year, and the Huntington roads nearly the whole of the other fifth. Eighteen other land grant roads received but 177,979 acres. The territory transferred to the Northern Pacific within the year is greater than Massachusetts, New Hampshire and Rhode Island combined. In the thirty years previous to Commissioner Lamoreux's administration but little over 2,250,000 acres were patented to this company. These facts are said to have so startled Secretary Francis that he has notified the land office that he will approve no more selections of land by the Northern Pacific.

PRESIDENT KRUGER has established a rigid system of passports for those entering the Transvaal, which went into effect on the first of the year, and which it will be well for those intending to go there to study. United States Minister Quinby at The Hague has supplied the Department of State with a translation of the decree covering this subject at the request of the minister resident there of the South African Republic, and has requested also that publicity be given to its provisions in the United States, from which country many persons have gone to the Transvaal. The decree provides that foreigners entering the republic must have proper passports from their own government, duly vised by a consul of the republic. The passport must show that the foreigner has sufficient means of subsistence, or can obtain such by his work. Failing to have this passport, proper letters of identification may be accepted. Admission to the country will be granted by the field cornet at the place of entry, who will issue traveling and resident passports, good for three months' stay. These may be renewed, and foreigners desiring to settle must make oath to obey the laws. The decree does not apply to foreigners already in the republic.

"TOO MUCH technical matter," writes a Sierra Co., Cal., subscriber. "Not enough technical discussion," says a San Francisco mining engineer. "Why so large a quantity of general mining news?" asks a Colorado reader. "You should have more news from the different mining camps," writes a New Mexico miner. Thus it goes. The idea is to give the most accurate information, condensed. Consider these columns as a well-set table, with a complete bill of fare. You may not like pie, while your neighbor across the table yearns for it. He may dislike olives, while you insist on having them. Very well, the pie and olives are there, take what you desire; pass the mustard, please. It is manifestly impossible to suit all tastes; but the fact that all through '96 an average of 200 new subscribers were monthly added to the mailing lists shows well for the general appreciation of this paper which aims to fill the field. Meanwhile criticism, adverse and otherwise, is gladly welcomed. A good deal is expected of this paper, and justly, too, and one good way to improve it is to pay prompt and respectful attention to our readers' suggestions. But no one more quickly or regretfully notes the imperfections of a paper than the men who weekly make it, and their constant effort is to give as little cause as possible for complaint.

GEORGE C. ARMSTRONG, writing to the New York *Sun* from Broad Arrow, West Australia, states that in that colony for the month of August, 1895, the number of companies registered was sixty-eight and the total capital £7,019,610. In August, 1896, the number was fifteen; total capital, £1,875,753. But for the first eight months of 1895 the capital of the companies registered was only £19,229,215, against £28,829,215 for the first eight months of 1896. The total capital of the registered companies is £74,176,925, the population 120,000, and the output of gold for the first nine months of 1896 193,406 ounces. He says: "Add to the 193,406 ounces already produced 100,000 ounces for the rest of the year, and we have, say, 300,000 ounces, valued at £1,200,000, as the returns for £75,000,000 of invested capital, 20 per cent of which is working capital. An average of 50 per cent of the working capital, or £7,500,000, has been expended and £1,200,000, or a little over 2 per cent of the invested capital, has been returned. In consequence, the London public has paid Western Australia an 8 per cent dividend, instead of receiving one of 20 per cent from Western Australia, as was expected." A list of salaries paid to the consulting engineers and managers of the mines of two concerns with a joint capital of £4,000,000 is £36,500—ten men in all. In this connection Mr. Armstrong says: "Miners receive £4 per week. The above companies employ 100 men. By reducing wages to £3 per week the corporations would save £50,000 per year, but by reducing salaries one-half they would save £20,000, without the expenses of a strike. Manipulations are everywhere evident here. Vast expenditures mark every movement of companies. The roads are ground into powder by teams hauling machinery which will be put up on 'mines' that have no ore. South Africa in its worst aspects is more alluring to capital than this immensity of dark promises. Here, where no edible life exists and no water that can be drunk without condensing, the reefs will not yield as many grains as South African reefs will yield pennyweights. Capital invested here without prudence now seeks not to recover what it lost, but to keep what it still has. A few months will prove this mining boom the biggest swindle of the century."

The Solution and Precipitation of the Cyanide of Gold.*

NUMBER III.

By S. B. CHRISTY, Professor of Mining and Metallurgy, University of California, Berkeley, Cal.

II.—THE PRECIPITATION OF GOLD FROM CYANIDE SOLUTIONS.

Those who are familiar with the instability of most of the salts of gold, and the ease with which all reducing agents, and even light, precipitate metallic gold will be surprised at the tenacity with which gold is held in solution as aurocyanide of potassium. None of the usual agents can be relied on to precipitate it; sulphydric acid, oxalic acid, sulphurous acid, ferrous sulphate, etc., which are usually so prompt in precipitating gold, are of no avail here. So long as the cyanide of potassium is in excess, they give either not the least trace of a precipitate or only a very imperfect one. In order to have these agents act with certainty, it is necessary to destroy all the cyanogen present. This is a long and difficult process. My attention was early directed to the need of a certain method of recovery, for precipitation by zinc shavings was exceedingly inconvenient in laboratory tests. For a long time the only certain method that could be relied upon was either to evaporate the whole solution to dryness in a dish made of test lead, and to scorify the residue, or else to acidify the solution with sulphuric acid, and boil till copious fumes of sulphuric acid appeared and the gold separated out in the metallic state. The solution was then diluted, filtered and the residue scorified. The results were satisfactory, provided the evaporation was pushed far enough to destroy all the cyanide, and no chlorides were left in the solution. Otherwise the results were liable to be low. The extreme tedium of this method, even on a laboratory scale, led very early in the study of the solubility of gold to a parallel study of the causes that contributed to the opposite effect, viz., the precipitation of gold from its solutions. In reality, these are the two opposite aspects of the same question.

According to most of the authorities, when a solution of potassium aurocyanide is acidified with sulphuric acid, the cyanide of gold promptly separates as a yellow precipitate. From the solution obtained in treating a gold ore with a 1 per cent cyanide solution, even when it contains several hundred dollars' worth of gold per ton, nothing of the sort takes place. The solution remains perfectly clear and colorless. It is only when the solution has been evaporated down and the acid gets concentrated and hot that the canary-yellow aurocyanide separates out. If the acid gets stronger, this salt is gradually decomposed, and finally metallic gold remains. The cyanide of gold is more difficult to decompose than the telluride. For it is only the strongest hot sulphuric acid which will convert the canary-yellow crystals of AuCy into metallic gold.

The remarkable fact that the gold remains in solution after being acidified with a strong mineral acid, and that a precipitate forms only on the long continued application of heat, seems to show that a compound $HAuCy_2$, which I shall call aurocyanhydric acid, is formed, similar to the ferrocyanhydric and the ferricyanhydric acids; in short, that we have to deal with an acid radical of the same class as the two just named, and not with an ordinary double cyanide, AuCy, KCy, as is usually supposed. There are many converging indications pointing to this conclusion which it would take too long to enter into here.

1. Regeneration of Potassium Cyanide from Dilute Solution by Acidification.

Before this fact was understood, it was thought that the gold was kept in solution by the free HCy left in the solution after acidification by sulphuric acid. If this free acid could be removed, it was hoped that the gold cyanide would be precipitated. At the same time it was hoped that the free HCy could be regenerated by absorption in caustic potash. This subject was exhaustibly investigated in February to May, 1893.

It was found that, although when acidified with sulphuric acid, a 1 per cent solution of potassic-cyanide gave not the least apparent trace of escape of HCy, yet, if the solution thus acidified was left for several weeks near an open vessel containing caustic potash, nearly all the HCy would be absorbed by the alkali. As this operation was too slow to be of practical use, air was pumped first through the acidified solution and then through the solution of caustic. The same air was used over again to avoid the presence of carbonic acid. By using steam with the air, the contents of the stock solution in cyanide were reduced in three hours from 1 per cent to 0.07 per cent of free HCy. By using absorption towers (the usual means of increasing surface exposure) such results might be reached in practice without the use of steam. Similar results were reached, without the use either of absorption towers or of steam, in from eight to ten hours.

At the same time it was found possible to regenerate from a 1 per cent stock solution of cyanide, a concentrated solution of any desired strength of potassium or calcium cyanide, with a total of cyanide actually recovered, up to 80 or 90 per cent. The avidity with which caustic potash or lime absorbs the HCy reduces the loss to a minimum. In case the solution contains alkaline sulphides, these would have to be removed previously by treatment with lead carbonate or sulphate.

A method was thus found which, with a little engineering skill, can be used for regenerating solutions of cyanide of potassium.

2. The Precipitation of Gold from Aurocyanhydric Acid.

Although it was thus found possible to remove, down to 0.01 per cent, the free HCy from such a solution acidified with sulphuric acid, still the gold, even to the amount of $603 per ton, or 0.1 per cent, would remain in the perfectly clear, colorless solution. As already stated, the only explanation found for this was the presence of aurocyanhydric acid ($HAuCy_2$) in solution. It was found that, even under these circumstances (absence of all free KCy, and only a trace of free HCy), all the usual reagents, such as oxalic, sulphurous, sulphydric acids, etc., failed to precipitate the gold, either giving no precipitate or else only a very imperfect one.

Experiments were made as early as March, 1893, with nitrate of silver, nitrate of lead, and mercurous nitrate. A complete precipitation of the gold resulted when an excess of nitrate of silver was added, either to the above aurocyanhydric acid or to the corresponding potash salt. This would be a neat and practicable method on the large scale, if it were not for the cost of the silver. The nitrates of lead and mercury gave partial precipitation in most cases.

Oxidizing agents, such as permanganate of potassium and peroxides of manganese and lead in acid solutions, also facilitate the precipitation. The filtration of the solution through red lead or massicott has been covered by an English patent granted to P. de Wilde, December 22, 1894.

3. *Precipitation of Gold From Potassium-Aurocyanide by Means of Charcoal.*

On July 3, 1894, an American patent was granted to the late William D. Johnson, at that time chemist of the California State Mining Bureau, for a method of extracting gold from a cyanide solution by passing the solution through a series of charcoal filters, and subsequently burning the charcoal and smelting the ashes with suitable fluxes.

The use of charcoal for this purpose had already been tried for extracting gold from the chloride solutions produced in the Plattner process. For this purpose it is certainly a very efficient method of precipitating gold; but the subsequent extraction of the gold from the charcoal is almost as troublesome as the extraction of the gold from the original ore.

Dr. Johnson claimed that a single filtration would remove 25 per cent of the gold, and that, by repeated filtrations, 95 per cent of the gold could be recovered by a single filter, it would take a very large number of filters to remove all the gold, and, consequently, a large volume of charcoal would have to be burned to recover it.

In order to test the method, the following experiments were tried: Two cyanide solutions containing each 100 c.c. with about 0.1 per cent of gold ($603 per ton solution) were each filtered through separate filters, and the process was repeated four times. Each filter contained seven grammes of charcoal. One of the solutions was alkaline, the other had been made acid with sulphuric acid. From the acid one 15 per cent, in the other case 6.5 per cent, of the gold present was precipitated by the charcoal. These experiments, made under more favorable conditions than could occur on the large scale, show that this method can hardly prove of service with rich solutions in practical work.†

†Since the above paper was presented at the Denver meeting, I have been paying more attention to the action of dilute solutions, and I have thought it well to investigate the action of charcoal on such solutions.

For this purpose the following experiments were outlined: Two solutions of 2000 ccms. each were prepared. The one (a) contained 0.001 per cent gold as potassium aurocyanide, or $6.03 per ton, but no free cyanide of potassium; the other (b) contained the same amount of gold, but also 0.2 per cent cyanide of potassium. Each solution was contained in a Marriotte bottle 11.5 cm. in diameter, so arranged that the solutions were discharged upon charcoal filters so as to keep the charcoal constantly submerged, and under a constant head. The charcoal was crushed so that it passed a 20-mesh sieve, but was mostly fine dust. It was contained in a cylindrical glass tube 10 cms. long by 2 cm. in diameter; it weighed in each case (dry) 10 grms.

It took nearly two days for the first 800 ccms. of solution to filter through each filter. The filtrate from (a) contained no gold; that from (b) contained a trace—less than 0.01 mg. The next 1200 ccms. took nearly five days to filter. Filtrate (a) contained 0.01 mg. of gold, while (b) contained 1.40 mgs. The charcoal from (a) contained 20.03 mgs., while that from (b) contained 18.70 mgs.

The actual recovery of gold by the charcoal was in (a), in the absence of free cyanide, 99.95 per cent; in (b), in the presence of 0.2 per cent free cyanide, it was 93.03 per cent. The free cyanide in the latter case was reduced from 0.2 per cent to 0.118 per cent.

These results are of great importance, for they show that under certain conditions all the gold can be precipitated from gold cyanide solutions by means of charcoal, and that even in the presence of free cyanide of potassium 93.03 per cent can be precipitated.

Further study of the data given above shows that the charcoal in (a) contained 0.2 per cent gold or $1206 per ton, while (b) contained 0.187 per cent or $1182 per ton. These figures would seem to represent the limit of enrichment at which the charcoal ceased to act in either case, the limit being lower in the presence of the free cyanide. In the case of the strong solutions previously tested (which were 100 times richer in gold), the content of the charcoal in the acidified test was 0.21 per cent gold or $1266 per ton, and in the alkaline one, containing a certain amount of free cyanide, it was 0.091 per cent or $548 per ton.

These results would seem to show that Dr. Johnson's view that the charcoal can be depended on to precipitate 25 per cent of the gold content at each filtration is erroneous. It would seem, rather, that a given amount of a certain charcoal has a definite capacity of precipitation; that within that limit it acts completely and promptly; beyond that limit it acts less completely and more slowly, and that finally it ceases to act at all; that the presence of free cyanide of potassium lowers its precipitation capacity, and perhaps at a certain point stops it altogether; that acidification seems to increase its capacity. These views are of course provisional, the subject being still under investigation.

It must be evident that, in its present form, the method gives a much less concentrated precipitate of gold (only 0.2 per cent) than either the zinc, the electric, or the cuprous methods of precipitation described later. The precipitate in the latter case often contains 40 to 60 per cent of its weight in gold, or it assays from $240,000 to $360,000 per ton.

4. Precipitation of Potassium-Aurous Cyanides by Mercuric Chloride.

Fremy (*Encyclopedie Chemique, t. 2, Metalloides, p. 463*) states that potassium aurocyanide is precipitated by mercuric chloride according to the following reaction:

$$2KAuCy_2 + HgCl_2 = 2AuCy_2 + 2KCl, \ HgCy_2.$$

This reaction I have also tested. A solution assaying several hundred dollars per ton, and carrying only a trace of free cyanide of potassium, remained perfectly clear for several hours after the addition of mercuric chloride. The next day, however, I found a yellow precipitate of cyanide of gold, so fine that it filtered clear with great difficulty. When, finally, a clear filtrate was obtained, the gold continued to precipitate for several days; it also had a tendency to adhere strongly to the walls of the tube. These indications seemed to point to the need of heat to hasten the reaction. Consequently I tried heating the solution. I found that this greatly aided the reaction. On boiling the solution for a few minutes the gold was almost entirely thrown down as the yellow cyanide, and could be easily filtered out, leaving a perfectly clear filtrate.

In the filtrate from the aurous cyanide the mercury could be saved and the cyanide recovered by adding, very exactly, the amount of sulphide of potassium to throw down the mercury as sulphide. Cyanide of potassium would thus be regenerated in the solution. The latter would then be ready for another leaching; and even should a little gold be left in the solution from imperfect precipitation it would not be lost. The precipitated cyanide of gold, gently ignited at a low red heat in the air, turns to pure gold.

This method of precipitating may be useful under certain circumstances, but the necessity of heating the solution adds so many complications and so much expense to a leaching process that it is robbed of many of its advantages. In the presence of an excess of free cyanide of potassium this precipitation does not take place.

(*To be Continued.*)

*Colorado meeting American Institute of Mining Engineers, Sept., 1896. (Revised Proofs Dec. '96.)

Some Cripple Creek Practices.

From Our Special Correspondent.

The milling capacity of this vicinity is as follows: Brodie, 80 to 100 tons per day; Metallic cyanide mill, Florence, 300 tons per day; Colorado-Philadelphia Reduction Company, Colorado City, 250 tons per day; Gillett Chlorination mill, 40 tons per day. Thus it will be seen that the cyanide and chlorination plants, which are running on Cripple Creek ores chiefly, have a capacity of over 600 tons per day. The output of the district may be expected to increase, and it is not unlikely that the mills will soon treat a larger proportion of the output than they are now treating. It is estimated that while the smelters have not handled half the tonnage of Cripple Creek ores, they have handled over half the values. As milling facilities become greater, and processes of treatment more perfect, the ore reserves of medium grade, found in the mines and on the numerous dumps, will be milled and their values saved. It is observed that, especially on Bull hill, there are thousands of tons of ore on the dumps, much of which is said to run as high as one ounce per ton in gold. Mills, situated as are those at Florence and Colorado City, are, of course, in position to handle ores from all parts of the country, and while their principal supply may be expected to come from this district, they will not be wholly dependent upon it. In the meantime plans are being perfected for the construction of additional chlorination mills in this district.

The Leasing System.—Those who have had experience as lessees in other mining districts find themselves somewhat handicapped by practices in vogue here. In the Leadville district, for instance, the usual term of a lease has been about five years. In Cripple Creek the term is generally one year and in a few instances two years. The royalties exacted are unusually high, which with the short life of the lease makes the proposition less attractive than in some other camps. When it is recalled that many of the big mines of the district were opened up by lessees, when the owners didn't have the nerve to go ahead, the importance of a satisfactory leasing system, as a district promoter, will be recognized.

Closely associated with the condition named is the matter of prices at which properties are held. There has been a certain glamour about the district which

placed a highly speculative value upon acreage, within the recognized district, which had no developments, proving absolute mineral value. This status of affairs has brought about the condition unfavorable to lessees and has indirectly kept down the number of men employed below what it might have been. Under a favorable leasing system fully double the present number of men would be employed in the district. Mr. Stratton, of the Independence, always prompted by generous motives, made purchases of properties, after the Independence became a bonanza, at figures which served to create a precedent for prices in the district. But the figures at which undeveloped properties have since been held are believed to have kept investors out in many instances.

While Cripple Creek is noted for the large number of individual fortunes made in the district, there is beginning to be seen a tendency toward consolidation and the gathering in of large areas by companies, whose management gives little encouragement to lessees, but who pursue a waiting policy which does not foster rapid development.

In reference to the number of men employed in the district, consideration must be given to the fact that in a camp of such high-grade ores as are found here, the tonnage output is far less than in such localities as Butte and Leadville, and the labor requirements correspondingly less.

Tunnel Enterprises.—There is little doubt that within the next year or two there will be several completed tunnels in the district which will greatly promote mining operations in the several hills of the camp.

The Moffatt-Bush tunnel, entering Gold hill just below the town of Cripple Creek, is in about 2500 feet, takes an easterly course, cuts about 300 feet below the present Anaconda workings and is designed to cut through Raven hill in the vicinity of the Morning Star and through Bull hill, coming out on the ground of the Victor mine. In pushing the work a strong flow of water was encountered, amounting at present, at the mouth, at about 45 gallons per second. As a result, the water supply in the various mines on Gold hill is seen to be perceptibly less than formerly. Work on this extensive undertaking is at present closed down, the first contract having been finished. The ability and standing of the projectors of the enterprise would seem to be a guaranty that the enterprise in due time will be made a success.

The Uintah tunnel, located in 1891, and one of the earliest in the district, enters Battle mountain in Arequa gulch, its objective point being the Portland group, and the breast is now in 900 feet. Its location is said to be prior to all claims in its course excepting one. It will cut the Portland ground at a depth of about 600 feet. Among the properties on its line are the Eclipse, Dead Pine, Granite, Baby Mine, Coriolinus and Ocean Wave.

The Columbine-Victor tunnel is a Squaw mountain enterprise and work is being driven from both the east and west ends. At the east end, near Victor, the work is in 700 feet, size 7x7 feet. On the west side it starts from Arequa gulch, and present workings are in 1000 feet. This tunnel will cut the Nellie V. vein and the M. K. & T. at a depth of from 400 to 600 feet.

The Squaw mountain tunnel starts on the northwest slope of Squaw mountain and has been driven 1500 feet and is said to have cut six veins. This tunnel has no doubt fully paid its way thus far. It is under bond and lease to Malony & White, the bond being for $200,000. The last ore shipments returned $250 per ton.

The Chicago and Cripple Creek tunnel is driving from Poverty gulch, above the Arcadia mine, into Gold hill, and is in 1200 feet. Some drifting is being done on veins exposed. Work is being pushed 15 feet a day with air drills. The Lelia is being worked in connection with this.

The Raven Gold Mining Company is developing its extensive holdings on Raven hill by some important tunnel work. One from Anaconda gulch runs toward the Gregory shaft, having reached a point 1150 feet from the mouth. Four hundred feet more will take it to the Gregory shaft which it will intersect at about 670 feet. The latter shaft is being sunk and is down 300 feet. This company's Raven tunnel starts in from the Elkton side of Raven hill and cuts above the one from Anaconda gulch. Its workings are in 1200 feet.

The Ithaca tunnel cuts through the saddle between Battle and Squaw mountains, and takes a northerly course toward the Necessity, on Battle. It has been driven about 1400 feet.

Work is likewise in progress on the Battle Mountain tunnel; the Standard, on Beacon hill; the May Bell, on Battle; and the Gold Dollar, on Beacon, the last being in about 900 feet.

A large number of tunnel enterprises have been projected, the utility of which are decidedly problematical, excepting in so far as the sale of stock may inure to the advantage of the promoters. Tunnels which are projected with the co-operation and the contract consent of the property owners on a given mountain, mainly for drainage and transportation purposes, are of practical utility, and with sufficient capital behind them are capable of being successes, and are destined to promote genuine development; but it is very doubtful whether those located for the purpose of taking advantage of the tunnel law as now construed, and depending upon the possibility of discovering blind leads, are not apt to have sufficiently smooth sailing to enable them to become financial successes. The law looks plausible, but the trouble is that the body of a mountain is not transparent, and no one can tell whether a supposed blind lead is really one or not; and the surface claimant who has discovered a vein is very likely to enjoin the tunnel projectors if he have grounds to suspect they are on his vein. Other surface claimants would do likewise, and the result would be that the tunnel people would be constantly tied up. The point is that the few tunnel schemes which have been successes are those which have had the co-operation of the surface claimant, instead of their antagonism. Those mentioned in this article are located either largely on their own ground, or have acquired contracts with the surface property owners.

WASCOTT.

Cripple Creek, Colorado, Dec. 18, '96.

Certain Stamp Mill Practices.

Written for the MINING AND SCIENTIFIC PRESS by JAMES W. ABBOTT, M. E.

In California the modern stamp mill had its origin. Here every feature of its construction has been patiently studied and intelligently elaborated. Many of these mills, in their mechanism and operation, are models. In some, where the practice is in the main good and the results satisfactory from a dividend standpoint, there is a disregard of certain details, the importance of which is either not recognized, or ignored.

One of the most essential principles of mill practice is to maintain as nearly uniform as possible every condition, which, from experience, has been determined as yielding the best results. If, for instance, experience has proven that in a certain mill, on a certain class of ore, a six-inch drop is to be preferred, some loss must follow a material departure from that condition in either direction. Some definite height of discharge is best suited on a particular ore to the other determined conditions of parts, drop, speed and amalgamation devices.

Reason indicates and experience proves that the contact faces of shoes and dies should be planes, parallel to each other and normal to the sides. When new they are so, and there is complete contact at every position of the shoe. It is very important that this relation shall be preserved during the life of both. This can generally, and I believe always, be approximately insured, with proper crushing and feeding, by a judicious selection of material for their construction. But in determining this question other considerations must not be overlooked. The more rapid the wear of shoes and dies, the more frequent must be the adjustment of tappets to maintain a uniform drop. The most nearly fixed unit of expense in milling is the cost of a day's run, and, of course, it is desirable to keep the stamps dropping with as little intermission as is consistent with the best average of all conditions practiced.

Many mills adopted the chrome steel shoes and dies because they were harder, lasted longer, crushed more ore, and consequently required less frequent adjustment of tappets than any kind previously offered. But these, while they unquestionably marked an epoch in stamp-milling, have not been found to give universal satisfaction, when used together. As they wear down, the faces, particularly of the dies, often become increasingly irregular and uneven. Many mills have found, in practice, and all authorities advise that the best results so far have been obtained by the use of a die softer and tougher than the shoe. Most mill men, who have used them, are loth to relinquish the advantages of durability offered by the chrome steel shoe, but they frequently seek a die of some material more likely to wear with an evener face. The experiments on this line have been varied and interesting. In the list are chilled iron shoes and unchilled dies; cast iron shoes on wrought iron dies; chrome steel shoes on cast iron dies; chrome steel shoes on Bessemer forged steel dies. Where there are local foundries which will utilize the scrap, some mills use chrome steel shoes and dies cast from a mixture, ascertained by experiment to give satisfactory results in their practice. Some throw a die into the scrap heap as soon as it begins to show signs of wearing unevenly. The representative mills in the Black Hills have concluded that they get best results from the products of local foundries for both shoes and dies. The character of their ore and their practice in its crushing probably has much to do with these conclusions. Certain San Francisco manufacturers are offering to the industry a hammered steel product, which may probably best answer the conditions in many localities, either for dies alone, or perhaps for both.

Another important condition to which I have referred is a uniform depth of discharge. The tendency of this to increase as the die wears down must be offset. This result has been reached in many ways. Cast iron plates (objectionable because they break), the remnants of old dies (objectionable because they wobble) and wrought iron plates have been inserted beneath, to raise the dies. Strips of iron, or wooden cleats, have been placed outside, covering to a certain height the bottoms of the screens, against which to that height the pulp inside backs up, until these strips are removed to compensate for the wear of the dies. In some mills one and sometimes two screens are kept, interchangeable and reversible, in which the bottom strips are of varying widths, and by their selection and position regulate the height above the dies of the screen openings. The tendency of the pulp within the mortar to escape upon removal of the screen is an objection to any practice that unnecessarily increases its depth. Three thin iron strips have been inserted flatwise, one upon the other, under the screen frame, to be consecutively removed as the die wore down.

When inside amalgamation is sought wooden chuck blocks of different heights are often used. A chuck block is made from two strips of plank, with their faces bolted together. Number one of these strips, whose width determines the height of the chuck block, is simply a false bottom for the screen frame. Number two overlaps the upper edge of number one, and this overlapping portion coincides in width with and presses against the bottom of the screen frame on the inside. To the rear face of number two, which has its upper inside corner rounded off, is attached a strip of copper plate. Some mills use two chuck blocks of different heights. Others use these two chuck blocks in connection with wrought iron plates, starting when the die is new with the higher chuck block and changing to lower as the die wears down. At the first general cleanup the plates are inserted under the dies and the higher chuck block resumed, to be again succeeded by the lower in the final stage of the die's use. In this practice the thickness of the plate should be just half of the full amount to be worn off from the die, and the difference in the height of the chuck blocks one-half of the thickness of the plates. The actual heights of the chuck blocks should be such that when the die is new and the high block in place the depth of discharge should be half of the amount by which the blocks differ less, and just before the first change the same amount more than the average desired. If the general cleanups are so timed as to come at the beginning, middle and end of the life of the die, the above relation of plate and chuck blocks will insure very closely the uniform average depth aimed at, without too serious variation between the positions of the face of the die with reference to the bottom of the plate on the chuck block, a very important desideratum in amalgamation, and one too often overlooked. If these intervals, though periodical, are not so timed, then some other relation between dimensions in chuck block and plates, easily determined, may better fit the conditions.

The other dimensions of the plates should be such that the set will fill the same space beneath the dies, with play enough for easy removal and each piece be not too heavy for convenient handling.

Where inside amalgamation is considered unimportant, undesirable, or unattainable, the thin iron strips under the screens probably give the desired result with as little trouble as any method.

Of course most mill men are familiar with the literature of the industry, but possibly some who read this article may be pleased to know where they can inform themselves more fully on the above and other details of their profession.

An article by John Hays Hammond in the 1888 Report and Bulletin No. 6, by E. B. Preston of the State Mining Bureau each treat on gold milling in California. The Trans. of the Amer. Inst. of Min. Engineers contain articles on gold milling by Raymond, Vol. 1; Munroe, Vol. 9; Bowie, Vol. 10; Rogers, Vol. 11; Egleston, Vol. 12; Hofman, Vol. 17; Abadie, Vol. 24; and Rickard, Vols. 23, 24 and 25. Nearly all of these have been republished by the MINING AND SCIENTIFIC PRESS. Treatises on gold milling and metallurgy have been written by Eisler, Rose and Louis and a work by Rickard is now in press.

North Carolina Gold Mines.

There are several hundred gold mines in North Carolina which have been worked with varying success ever since the first discovery of a number of valuable nuggets in the county of Cabarrus more than one hundred years ago. During the past few months a great deal of gold mining property has changed hands, and experienced miners are going into the State for the purpose of renewing work in some of the old mines with modern mining appliances and machinery.

Two of the largest mines in the State, both located within two miles of Charlotte—the Rudisill and the St. Catharine—are now having the water pumped out of the shafts, and extensive preparations are being made to again push the work on a more extensive scale than ever before. The Little Fritz Gold Mining Company, organized under the laws of Colorado, has bought 150 acres of land in Cabarrus county.

Then there are a number of Eastern capitalists and Western miners in the gold districts examining properties.

Mining Summary.

CALIFORNIA.

Amador.

VOLCANO DISTRICT.

(Special Correspondence).—The Azalea Mining and Milling Company of San Francisco has lately come into possession of the Dane and Mitchell mines, a half mile below the Reward mine, on Grass Valley creek. The company has just completed the rebuilding of the old Dane mill of ten stamps, and will be ready in a few days to crush 20 to 25 tons of rock per day.

Messrs. Thomas Day and Son, of San Francisco, are driving a tunnel to reach a large ledge of promising rock on Grass Valley creek, half a mile below the Azalea Company's mill. The work is superintended by Mr. J. R. Smith.

The Woodpecker claim, on Grass Valley creek, has about 100 tons of milling ore on the dump, which will probably be treated at the Azalea Company's mill.

The new 5-stamp battery recently added to the Reward 5-stamp mill is working satisfactorily, and Mr. James, the superintendent, alleges his ability to mine and mill the Reward ores at a cost of $1 per ton.

The Messrs. Gillick, of Volcano, recently discovered what appears a rich vein of good quartz, near Sutter Creek, northwest of Volcano.

Some of the old abandoned mines in the Volcano district have been recently under expert examination, with a view to reopening a number of them.

Considerable of a stir is observable about Oleta, in this county, due to the fact that a party of gentlemen have lately bonded a considerable area of the auriferous gravel, and propose to place the property with an English syndicate.

Pine Grove, Cal., Dec. 31, '96.

Ledger: The shaft at the Union Consolidated is now down 480 feet. Twenty stamps are being run on the Gouge ledge at the 300-foot level. They are running a level for the Gouge ledge at the 400, now being in about 60 feet. They expect to encounter it in a few days.

Superintendent Purrington, of the Gover, has taken the water out of the shaft, and resumed sinking. They have encountered a good ledge, and will start five stamps on it within a few days, making a test crushing.

The El Dorado mine, the property of Charles Wryon, has been sold to Louis Sloss, of San Francisco, and others, and timbers and machinery are being put on the grounds to resume sinking.

The Amelia Company has been incorporated for $2,000,000, to operate the Hoffman field, the property of Deter and Hoffman. They are arranging to prospect the ledges which run through the Alma shaft.

At the Pocohontas orders have been given to sink 1000 feet before prospecting the ledge. The new machinery for hoisting is on the property, and was started up this week. It is of capacity sufficient to sink 1500 feet.

The milling test of Argonaut ore at the Zula mill has proven satisfactory. While drifting between 240 and 250 feet north from the shaft on the 1250-foot level the workmen ran into some old works, probably a south drift from the Kennedy mine. This was encountered at a point about 25 feet inside of the line which the Argonaut claims as their north boundary.

H. W. Tangerman, who has charge of the Lombard mine, has constructed a 20-ton mill, and is now milling good rock from a thick ledge, which averages about $12 per ton. The present milling plant is experimental, and will be supplanted by a larger one as soon as the ore body is sufficiently developed.

Dispatch: At the Oneida the shaft is down over 650 feet, and sinking is being pushed as rapidly as possible.

At the Muldoon quartz mine, located on the same ledge as the Argonaut and Kennedy mines, a shaft has been sunk 125 feet on the lead, and the quartz in the bottom was wider than the shaft.

At the Good Hope they are taking out some good-looking ore, and the 5-stamp mill is kept running night and day. There has been no clean-up at this mine yet.

At the Red Hill Milling and Mining Company's property the 10-stamp mill is crushing from forty to forty-five tons of rock daily. The rock is mostly decomposed quartz, carrying a lot of free gold, but heavily impregnated with sulphurets.

Butte.

Mercury: The Pete Wood mine, one of the number owned and operated by the English syndicate, George H. Evans, general manager, is located on the east side of the Forks of Big Butte. E. C. Paxton is superintendent, and employs thirty-five men. They have a tunnel into the mountain, on the bed rock, a distance of 940 feet, and gravel is encountered which pays fairly well. The superintendent is expecting to tap a main channel that will narrow down and afford a larger yield of coarse gold. The drift at present covers a breast of 90 feet.

Register: The Magalia mine is working a crew of from forty-five to fifty men. This does not include the men who are chopping wood and getting out timber.

The tunnel at the Indian Springs mine is in 1500 feet.

Mercury: At the Magalia mine forty-five men are employed. All machinery above ground, including the air compressor, is run by water power, while compressed air is the power employed for all underground machinery.

Calaveras.

The Utica mine puts about $35,000 in circulation in the vicinity of Angels each month.

Prospect: In the Jenny Lind district the Mountain King mine, in Salt Spring Valley, is down 210 feet, showing a 4-foot vein of rich sulphureted ore.

The Live Oak mine, near by, is in a talc-slate formation, and shows much free gold in places.

Angels *Voice:* Huston and Mercer have leased the Codrington mine in Purdyville, formerly the Dead Horse, and have extended the tunnel about 20 feet. This tunnel was first opened in 1858, and is still in good condition.

The tunnel at the Calaveras Consolidated is retimbered for 1215 feet, and for the last 40 feet has been cutting the vein transversely.

Chronicle: At the Emerson mine, near Mokelumne Hill, a double compartment shaft is being sunk between the two parallel ledges which are about 100 feet apart. The machinery on the mine is capable of sinking to a depth of 1000 feet.

The Pellaton placer and quartz mine on Tunnel Ridge, near Mokelumne Hill, is bonded by C. H. Pfeiffer to San Francisco parties, who will sink.

At the South Paloma the shaft is now down 330 feet. It is the intention to sink 600 feet, when a station will be cut and the work of crosscutting the vein commenced, but the work of sinking the shaft will be continued to a depth of 1000 feet.

Calaveras and Tuolumne.

(Special Correspondence).—The Norwegian, just across the river at Robinson's Ferry, in Tuolumne county, has been sold to owners of the new bank at Sonora, for $25,000. Moffat & Cleveland are looking for something for Eastern connections and they are still in the neighborhood of Sonora.

The California Ophir mine at Carson, just down the hill from the celebrated Morgan mine, has been sold to Eastern parties. Mr. McMullen examined it last week and endorsed it. It has been kept out of the market for these many years by the extreme price asked for it. It looks as if there was a hitch in the sale of the Bald Hill again. It is a good mine and why it has not been sold is an enigma. Frank Baumhogger has his new hoisting engine in place on his mine just above the Utica, and from the results he is getting from his rock and its location, if he does not find buyers before long it will surprise me. The new shaft on the Utica is going down nicely, 100 feet to date. They are working three drills in the shaft, which is 17 feet in the clear. This shaft is being sunk just 280 feet from Mr. Tryon's mine, which about insures the sale of it to the Utica for $75,000. Chas. Tryon on the Ghost mine has got into such hard rock in his shaft that he is looking around for a compressor and power drills. The Santa Anna have put an extra drill in their shaft, being stimulated to extra exertions by the work being done at the new shaft of the Utica. I hear the French expert has turned down the Chapparal Hill property, but am not prepared to believe it.

We look for lively times along the lode after the 1st. Tuolumne county seems to have the pull now. From the Stanislaus to Stent along the lode there are signs of good times ahead. What we want on this side of the river is for some deserving company like the Santa Anna to strike it rich and then the faint hearted here will take hold. That company is mining like they do at Jackson in Amador; they are going down 500, 600, 700, 800 feet, before looking for a mine. Another thing which militated against Angels is the idea that has gone abroad amongst mining men, that the Union Water Company, controlled by the Utica Company, will not furnish water to other companies. This is untrue and unjust to the Utica Company. I am told positively that the water company will furnish all the water asked for by those who have the money to pay for it and they are ready at any time to put in an electric plant at Murphys, getting their water power to supply it from Coyote creek and supply the electric power to responsible parties. These facts ought to be more generally known, as many influential men have told me they could not recommend properties around Angels as water could not be had. Independent of the present company, if any parties want to operate mines in this vicinity there is ample opportunity to get all the electric power they want from contemplated plants on the Stanislaus. Mr. E. K. Stevenot, the engineer and mine owner here, has made all arrangements for a 200-H. P. plant on the river.

Angels, Cal., Dec. 29, '96.

El Dorado.

(Special Correspondence).—W. O. Frost and Rollin P. Saxe have purchased the Skinner & Lemon mining property, situated one mile north of Placerville. This property has been worked for many years from time to time, but to no greater depth than 45 feet. From a space 1700 feet in length $80,000 have been gathered through mortar process. Mr. Frost will be superintendent, beginning work Jan. 6th, running a 280-foot tunnel to intersect the diabase footwall. Then he will drift and sink deeper. A mill will be erected as soon as conditions warrant. Work will be prosecuted day and night.

At the Larkin mine a new shaft on the east vein has reached 55 feet on a 5-foot ledge of good milling ore. The new 5-stamp mill is in continuous operation.

Over at Greenwood development work is actively pursued on a large scale and considerable capital is being invested.

At the Landecker gravel property, two miles south of town, the tunnel has reached 1700 feet. One upraise of 40 and another of 50 feet have been made. The gravel looks quite promising, and it is expected that a 10-stamp mill will soon be in operation.

Mr. Thacher of Toledo, Ohio, one of the owners of the Big Sandy, is visiting the property. He contemplates placing a larger pipe line and actively pushing the work both of sinking and drifting.

B. F. Lloyd of Oakland, who recently bought the Gardner and Noyes claims, one mile north of town, is crowding development work rapidly. Seven men are employed. The shaft has reached 60 feet. A tunnel has been started that will be driven a distance of 450 feet, reaching "backs" of 250 feet. Machinery will be placed this week to operate power drills.

Placerville, Dec. 29th, '96.

Inyo.

Register: At Casey the New Years claim at the southerly end of the Inyo Gold Mining Co.'s group of mines is showing up remarkably well. Five or six large chimneys of fine ore were exploited and mined to the canyon's level without exhausting them, years ago. Two tunnels started on the vein show up large ore bodies.

At Darwin work has been commenced on the Lane mine with a force of eight men. The new shaft will be sunk 50 feet deeper.

Mr. Garlick of the Argus Gold Mining Co. is putting up cyanide works at the Snow's canyon mill.

Mariposa.

Gazette: The Rollins mine at Sweetwater, which has been bonded to Gage, Wallace and Smith of San Francisco, was sold this week to the parties named in the bond by the Revels brothers.

Nevada.

(Special Correspondence).—The Bullion mine will erect a 20-stamp mill in the spring, and the plant will be run by electricity.

The Brunswick mine is preparing to put in electric power.

Herald: The San Franciscans who bonded the Kirkman mine last year have, under the direction of Superintendent John M. Buffington, opened up about 1500 feet of ground. Last April they started a crosscut which they ran 300 feet in tapping the ledge. From this a drift was run eastward, where a first-rate body of ore was struck. Continuing for 500 feet another shoot of ore was struck. This was in September last. They have now drifted 200 feet on the ledge, and it looks better and better as they get into it.

Williamson and Cole have bonded their mine, the Giant King, at Washington, to Wm. S. Bell of Oakland. The Giant King ledge is an immense formation of low-grade ore.

Plumas.

National-Bulletin: At the Claybank mine, near La Porte, several men are employed in running the main tunnel ahead to reach the gravel deposit tapped by an upraise several months ago.

At the Thistle Shaft mine seventy-five men are employed. Until recently there has been a supply of water to wash all the gravel hoisted, 250 carloads per day. From now until spring opens gravel will be stored in the large dump provided for such purpose.

San Bernardino.

Dale is a new postoffice at Virginia Dale mining district.

Independent: Don Palmer of St. Louis and others have gone in to develop the Van Slyke mines, eighteen miles southwest of the Needles. The ledge shows an average width of over 50 feet for a distance of 1000 yards or more. Assays from the surface rock returned $6 a ton. Two or three thousand dollars will at once be spent in crosscutting the vein and other development work, and if all goes well an 80-stamp mill will be put up.

Shasta.

Free Press: At the Princess hydraulic mine, near Muletown, the ditch will be opened from Boulder creek to the mine in about two weeks. The great pipe syphon, which is 2000 feet in length, will be put in at the crossing of Clear creek as soon as possible.

Courier: At South Fork the people who bonded the Hope have 200 feet of tunnel completed and have let a contract for 200 feet more. This will take them to the old works and 100 feet deeper.

Nichols & Robinson are running a crosscut on the Manzanita fraction.

The ditch for the Princess Company is about completed and they will be ready to wash gravel next month.

Siskiyou.

Journal: The Erno mill, at Mugginsville, has been in operation for two weeks, and the owners have opened up two ledges. In the past the greater part of the ore taken from the ledges around Quartz Valley has been crushed in arrastras.

At the Glen Ellen mine, in Quartz Valley, they are now down about 85 feet, and expect to sink the shaft over 200 feet. Theirs is the only compressed air plant in Siskiyou.

The owners of the old Shinar, or Nanetta B. mine, have the pipe laid across the river now, and will be ready to commence operations in about three weeks.

Reporter: Down on the Klamath there are many notices of new locations. Old works are being put into order for operations in the spring. The Minnie Placer Mining Company and the Dr. Simmons Company, near Nolton, are preparing for work. So is Dr. Dean, near the same place. The Simons Company are building a suspension bridge over the Klamath to carry a water pipe to their mining works on the left bank.

Journal: The hydraulic mines all over Siskiyou are starting up, and will be kept in operation from now until next summer. In the Salmon river country, and along the Klamath, some large plants have been put in during the past few years, which will largely increase the output of gold in this county.

Mining operations will be commenced at the big hydraulic mines in Oro Fino, immediately after the holidays, unless the weather should be too cold, which would result in stopping the flow of water.

Tuolumne.

Union-Democrat: The Seminole group of mines which have been idle for three months past, will be worked on a larger scale than heretofore. A new company has been organized to take hold composed of California capitalists in the main, though some English capital is invested. Soon after January 1st, active operations will begin.

The Golden Gate employs seventy-three men and is working on good ore.

At the Confidence the new mill building is ready for the 20-stamp machinery.

At the Dutch the work of enlarging the present shaft is being prosecuted.

At the Mammoth the additional five stamps are in place and a rock crusher and four concentrators are being put in.

At the Dead Horse the mine has been pumped dry and good grade ore is being mined and treated at the mill.

Yuba

Marysville *Democrat:* Only a short time ago an old lode claim near Frenchtown, in this county, was bonded by a couple of practical mining men for $20,000, and now the work of development is going on.

Two claims near to Strawberry Valley, in this county, have been bonded at figures above $20,000, and both are being prospected; at the same time there are a dozen more claims in the same vicinity lying idle. No better investment could be made to attract attention to this county than the formation of a company, and the contribution of money with which to prospect and advertise the mineral resources.

NEVADA.

Reno *Gazette:* In Humboldt county there is more assessment work going on than has been for years in both gold and silver properties.

The Golden Chariot mine at Dun Glen, recently purchased by Callahan & Carlick, is in operation under the new management. They are running a patent mill, but it will be replaced by a 10-stamp mill the latter part of the month.

The Blackbird, a gold mine, twelve miles north of Mill City, owned by Michigan capitalists, will resume operations next week. The mine and mill were closed down about three years ago on account of bad management. At the time operations on the mine were suspended, a tunnel was being run to tap the ledge. Work will be resumed at once on this tunnel, which will tap the ledge at a depth of 80 feet below the lowest workings.

In the Wilbur group of mines, situated twenty miles north of Mill City, in Central mining district, the ore contains gold, silver and lead, and is shipped to the smelters. Mr. Wilbur is working eight men at present. He expects to dispose of the property to a French syndicate, whose representatives are now on the way here to examine the property. He holds the group of mines, consisting of five claims, at $150,000. He purchased the property one year ago for $5000, since which time he organized a company and has spent considerable money in developing it. It has more than paid for itself already, and is in excellent condition for the market.

The Nevada National Nickel Company, of Cottonwood, Churchill county, will start up its electrical plant next week. The Nickel Company has spent a large sum of money in an electrical plant for reducing the ore, and, if the experiment is a success, regular shipments of ore will be made.

Winnemucca *Silver State:* A strike of gold ore, assaying high, has been made in the Oest mine at Silver City.

Walker Lake *Bulletin:* Fifty tons of ore from the Bounce mine, in Silver Star district, milled by the Douglass Company last week, yielded $35 per ton. The mine is the property of Lothrop, Pepper & Davis.

De Lamar *Lode:* At State Line district the Rice brothers will soon put on two shifts of miners. Ore that can be handled has been struck, and is believed to be in paying quantities.

Notwithstanding the many discouraging obstacles that have to be met with, development work is progressing throughout the camp, a majority of the mines sending up ores that will not pay to ship, but which will return profits to the owners when our mill, which is promised to be ready for ores May 1, 1897, shall have been completed.

Lyon County *Times:* The Succor mine in Silver City, formerly owned by S. Longabaugh of Empire, has been sold to James, Taylor & Deitrich for $10,000. The mine in years past has produced good ore.

Elko *Free Press:* Another copper strike has been made at West Camp, on the Star of the West. The ledge is 8 feet wide.

The Ben Hur Mining Company of Granite district, recently organized in Salt Lake City, want to erect a 10-stamp battery on the stream at Campbell's ranch.

OREGON.

Baker City *Democrat:* The following mines in the gold fields east of Baker City will be equipped with mill plants early in the new year: Flagstaff, Con. Virginia, Columbian, Perry and Rachel. In other districts mills are contemplated, and the outlook is very promising.

Grants Pass *Observer:* The Lewis ditch, built to work mines near Leland, has been completed, and as soon as the pipe is placed in position, piping will begin. A large number of men have been employed there for several months past.

C. M. Howard has consummated a deal for the purchase of the old Lane black sand mine, near Randolph. He is associated with other San Francisco men, who will at once begin active operations. In testing the sand Mr. Howard found it contained as much value in platinum as it does in gold.

JOSEPHINE COUNTY.

Mr. Bates, representing the Standard Oil Co., is again at Riddle and new developments are expected in the Nickel mine sale. The company is preparing to erect big steel works

at Chicago in order to compete with the Carnegie company, and they need the nickel to use in the manufacturing of steel. What seems to be causing some delay in the consummation of the deal is the mixed title to the old mine, upon which the International Company partially erected a plant a few years ago, and which Mr. Bates' syndicate wishes to utilize.

WASHINGTON.

Spokesman-Review: J. J. Malone has closed a deal for Eastern capitalists for a controlling interest in the properties of the Burton Gold Mining and Smelting Company, located on Grouse Mountain, just south of the international boundary.

BRITISH COLUMBIA.

Spokesman-Review: At Lowry, near Illecillewaet, there is being put up a 200-ton concentrator for the Lillooet, Fraser River and Cariboo Gold Fields Company (limited) on the Lanark group of claims. The ore is silver-lead, which will run 65 ounces of silver and 75 per cent lead.

The Novelty Mining Company has given an option on a controlling interest in its property to a London syndicate for $200,000, the option to expire on January 1. The Novelty is on Red mountain, not far from the Le Roi.

The machinery at the Hall mine is in place, and is sufficient to handle over 200 tons of ore per day. The lower tunnel is in over 600 feet, and it is expected the first large body of ore will be reached in a few days. The tunnel, which is a double-tracked 9x8 working tunnel, will be continued about 500 feet more.

British Columbia *Mining Journal*: It is expected that a ditch, to carry 2000 inches of water, will be run from Baker creek, opposite Quesnelle, to the property of the Menominee and Maranette. The distance will be about ten miles.

Trail Creek *News*: The Ram's Horn claim, north of Fort Steel, has been bonded to Montana parties. It was located last summer by Grundy and Sprague, and is a silver-lead proposition. Mr. Sprague reports that the bond is for $50,000.

The North Star Company will take out from 6000 to 8000 tons of carbonates during the winter. They will ship nothing but carbonates next season, as they run from 90 to 100 ounces in silver, with a small percentage of lead.

Rossland *Miner*: The Noonday Mining Company has been organized, with $1,000,000 capital, to work that property, near the Hall mines.

The shaft of the Palo Alto is down 80 feet, with 3 feet of good ore in the bottom. The ore will assay about $30 in gold.

John S. Baker, the principal owner of the I. X. L., announces that the mine will at once be equipped with a compressor plant, and that a 10-stamp mill will be erected at an early date.

Plans and specifications are being made for a steam hoist and 4-drill compressor plant for the Sunset. The shaft, now down 40 feet, is to be continued by hand.

UTAH.

Salt Lake *Tribune*: The West Dip at Mercur has been followed up by Hartwig A. Cohen, general manager of the Golden Gate and other De Lamar properties; 12,000 feet along the strike of the vein are covered by his stakes. Mr. Cohen believes that the zone which has been punctured in the La Cigale and Omaha continues into Rush valley, and to demonstrate it work will begin in a very few days through a shaft.

At Bingham it is proposed to put up a plant that will enable the owners of low-grade ores to convert them into a matte and in that form handle them at a profit.

At Mammoth the hoisting machinery is on the ground for the Mammoth hoist, and it will be in operation in sixty days. Several new bodies of ore have recently been opened up on the lower levels, and one body on the 1500-foot level is reported to run as high as 91 ounces in gold.

Tintic *Miner*: At the Humbug a new ore body has just been opened up showing about 18 feet of solid ore. The work on the lower tunnel still continues.

A certificate of the incorporation of the Tintic Mining and Development Company has been filed. This company was incorporated in West Virginia in August of this year with a capital stock of $1,500,000 to continue the development of the Soux-Ajax tunnel.

Bingham *Bulletin*: Work has been resumed on the Atlantic tunnel. This tunnel will give drainage to and form a deep outlet for the Atlantic Company's group of mines—the Atlantic, Benjamin, Picket Post, Isabella, Cedar and Robin Red Breast claims—and in its progress is expected to tap ore bodies. It has already been driven nearly 900 feet.

Eureka *Democrat*: The Mammoth mine is still sinking and the 1600 level will be reached in a short time. It is the intention to continue for several hundred feet further. The Mammoth will be the deepest hole in Utah.

IDAHO.

Spokesman-Review: The question of closer concentration of the silver-lead ores of the South Fork is one that has been seriously considered by mine owners ever since the first mill was erected, and it is still as serious as ever. Millions of dollars worth of lead and silver have already gone down the South Fork, and in spite of vast improvements tens of thousands more go every month. Probably no mine in the world has produced as much wealth during the same time as the Tiger-Poorman, Hecla, Black Bear, Helena and Frisco, Standard, Union, Milwaukee and Granite have dumped into Canyon creek along with their tailings. With a view to stop part of this waste an addition 32x100, 14 feet high, is now being made to their mill, which will be filled with tables, vanners and other devices for extracting the ore from the tailings.

At the Pierce camp besides the American Placer Mining Company and several other outfits in Hay gulch, French creek, Rhoades creek, the Bingham Brothers have completed 3960 feet of flume on their property on Reed's creek. They have acquired property reaching for fifteen miles along the creek. Two ditches, one eight miles and the other six miles in length, have been completed, which will furnish a sufficient volume of water to operate the claims.

At Wardner the Bunker Hill and LastChance companies are running a full force. The Stemwinder is working about 60 men, under a lease to J. E. Branscombe. The last named mine has recently been sold by the receiver to the Bunker Hill company.

Following is a synopsis of the manager's report to the De Lamar company of Idaho for the month of November, 1896:

Tons crushed	1,186
Bullion realized	$46,800
Ore shipped	5,800
Other revenue	125
Total	$52,725
Cost and expenses	40,490
Estimated profit	$12,235

MONTANA.

The first annual report of the reorganized Anaconda Copper Mining Company for the year ending June 30, 1896, has been published. The profits of the company for the year were, in round numbers, $4,000,000. The following data is given:

Ore received at reduction works, 1,276,156 tons.

Shipped from Anaconda 107,036,697 pounds of copper.

Shipped from Anaconda 5,308,955 ounces of silver.

Shipped from Anaconda 18,300 ounces of gold.

Total expenditures at the mines, $5,071,677.61.

Total expenditures at Anaconda works, $5,616,516.76.

The company's sawmills cut nearly 12,000,000 feet of lumber per month.

The coal mines produce 60,000 tons of steam and furnace coal per month, and the coke ovens 2700 tons of coke per month.

Concerning these items Mr. Daly says: "The much diminished cost of coal, timber, coke, etc., compared with preceding years, proves the wisdom of the large expenditures for these departments, amounting on June 30, 1896, to $4,755,399.16."

The company pays 35 cents per ton for shipments of ore, coal and coke over the B., A. & P. Railway. The cost heretofore was from 40 to 60 cents per ton. The Anaconda Company owns 51 per cent of the railway. Mr. Daly concludes his report as follows:

"My anticipations for the present year (1896-97) are very favorable. The mines are in good shape for producing ore in large quantities, and at the deepest places in three of the mines—the St. Lawrence at 1200 feet vertical, the Bell at 1300 feet vertical, and the Mountain Consolidated at 1100 feet vertical—bodies of good grade ore are being developed, thus promising well for the future of the mines with increasing depth. The reduction works are in excellent condition and are running with great smoothness. The cost of supplies of coal, etc., will be less than ever before, so, unless something unforseen should happen, I expect that the cost per pound of copper will show a marked reduction as compared with the present statement.

"During the past year something over $1,000,000 of our profits have been absorbed in permanent improvements. For the present year I anticipate such additions will be kept in very moderate limits. At the mines we are erecting two very powerful hoisting engines, with a capacity to hoist from a depth of 3000 feet vertical, but the cost of these engines and other new machinery will be charged to mining, and, although the development work will be most vigorously pushed forward, I do not expect that the extraordinary mining costs will be larger this year than was the case in 1895-96. The timber and coal departments will absorb for 1896-97 say $140,000 new capital, and perhaps some enlargements may be needed for the water supply of the town of Anaconda. Therefore my expectation is that the profits shown in the next annual statement will be nearly all available, either for dividends or for additional working capital."

Butte *Miner*: The Boston & Montana Company has advertised for bids to sink 500 feet in the Atlantic shaft and the West Colusa. The Atlantic shaft will be sunk 200 feet deeper and the West Colusa will be sunk another 300 feet before crosscutting commences.

Inter-Mountain: The Waterloo Copper Mining Company has commenced operations on the McQueeny property, in the Waterloo district. The company is now in 280 feet on the tunnel which they propose to run 1000 feet.

The 10-stamp mill at the Snowy Mountain mine in the Independent district has enough ore in sight to keep it in constant operation for a year.

SOUTH DAKOTA.

Black Hills *Times*: The Union Hill Company have fully decided on the erection of a new 100-stamp mill in Galena camp and also to remodel the old Richmond silver mill and make an 80-stamp mill of it.

John Pierce, of Sioux City, recently secured options on over one hundred claims situated on the free-milling ore belt, adjoining the properties owned and managed by the Homestake Company. The mines bonded to him extend two miles from the mouth of Poorman on Deadwood gulch to Kirk on Whitewood. The strip varies in width from 1500 to 3000 feet and contains millions of tons of pay ore. It is proposed to erect a 400-stamp mill on Belle Fourche or Redwater, to be run by water power, thus reducing the cost of milling to a few cents per ton.

The Keystone M. & M. Co. have decided to double the capacity of their stamp mill and enlarge the cyanide annex for the treatment of the concentrates.

Ragged Top continues to be the center of attraction. Numerous sales and transfers are of daily occurrence, which in the aggregate amount to a considerable sum. All investments so far have been made by local capital.

The report of a rich strike in the Flora shaft on the Dacey and Kilpatrick ground in Ragged Top camp has been confirmed.

The shaft on the Badger group of claims, situated in Ragged Top camp, is now down about 50 feet and has struck an 18-inch vertical vein of ore.

WYOMING.

Tests of the vein of coal recently discovered along the line of the Fremont, Elkhorn & Missouri Pacific Railroad, east of Laramie, show that the coal is nearly equal to the Rock Springs product for domestic use. The vein is six feet thick, and was found in an excellent location for mining and transportation. Several carloads of the coal have already been shipped East.

Lander *Clipper*: A big deal is reported on the Miners Delight property and that of the Diamond Developing Company. The property mentioned in the agreement and deeds in escrow comprise 2040 acres of gold lode and placer claims. The consideration is $200,000, and the agreement is between Edward C. Bartlett, of Omaha, and William R. Parks, of Chicago, with the approval of William Sturgis, of Cheyenne, the legal holder of the title.

COLORADO.

The number of men employed at Silver Plume is 150, Georgetown 300, Empire 140, Lawson 75, Freeland 75, Idaho Springs 1100, Lamartine 100 and Yankee Hill 60, making a total of 2125 miners and mill men.

Denver *Republican*: At Cripple Creek James Tobin of Florence, Wis., has purchased the Burtie, on Carbonate hill, of S. N. Wood, administrator of the estate of W. H. Williams, for $6000.

The Ironclad Company has purchased the lease on its ground held by Murphy, Howell & Sullivan, and will work the property on its own account. Since ore was encountered, about ten months ago, the Ironclad has produced approximately $50,000, on which the company has received close to $10,000 in royalties.

A new corporation known as the Cripple Creek Sampling and Ore Company, of which Charles L. Tutt is president and Spencer Penrose secretary and treasurer, has decided to put in a new sampler in Cripple Creek.

The Maloney cross-vein has been entered in the fifth level of the Anchoria-Leland and found filled with rich ore that assays from $100 to $500 a ton. In the 300 foot working the chute has been followed for 250 feet east, and shows continuously the entire length of stoping almost to the surface.

A shipment of twenty-five tons of $100 ore has been made from the Tomkins and Cone lease on the Hull City placer, adjoining the Vindicator group on the north.

Eastern parties who are working the Tecumseh on Raven hill are now making steady shipments from the ore body which has been under development for several months past. Two levels run south from the shaft 180 feet deep found a wide body of low-grade ore into which comes a small seam of sylvanite rock.

At Twelve Mile Camp in Gilpin county the Morse mine has been sold to a Chicago Company. They have purchased a plant and are going to work this winter.

The Racine mine, in the Ten Mile district, has been sold to a party of men from Rochester, New York, for $35,000.

The report that the Morning Star mine at Ward had closed down is without foundation. On the contrary, it is working steadily and is doing well. Over $6000 was paid out to the employes last Saturday.

An English syndicate has taken hold of the Orphan Boy and Gold Dust group at Copper Rock, and extensive work will be begun.

At Central City Collins Bros., operating the Forfar property, are shipping monthly to the concentrator in Black Hawk from 200 to 250 tons of ore.

The Katie lode, on Bobtail hill, believed to be the extension of the Carr vein, is showing well in the shaft at a depth of 265 feet. The smelting ore streak is 18 inches wide and nets $65 per ton.

The Gunnell mine gives work to from forty to fifty men, and the output of mill ore is sufficent to keep forty stamps dropping night and day at its own mill, treating nearly fifty tons per day.

NEW MEXICO.

Governor W. T. Thornton of New Mexico speaking of the Mexican land grants and mine titles in that Territory says: "Our mining interests are very large, but in that direction New Mexico labors under a very great disadvantage in the fact that so much of our Territory is covered by the old Spanish grants, many of which are now being considered by the Court of Private Land claims. The old Spanish law did not convey the mineral in these grants, reserving it for the crown, and when these grants have been confirmed by Congress the same course has been pursued. But there has been no disposition made of the mineral lands within the grant boundaries, that matter remaining to be settled by Congress at some future time, and, consequently, the lands containing mineral deposits have not as yet been thrown open for settlement. New Mexico is extremely rich in mineral wealth, but there are so many rich deposits included in the grants that the condition of affairs is a great drawback to the development of our mineral resources. A great many of these land grant claims are being disposed of, however, by the Court of Private Land Claims, and, as titles become quieted, our mining enterprises will gradually become more important. Some of the owners of the land grants which have been confirmed by Congress have title to the minerals included within the boundaries of their grants, but in all such cases the right has been conveyed by special act of Congress, which operated as a quit-claim to the mineral on the part of the United States. In all other cases the right to the mineral is vested in the United States."

Silver City *Enterprise*: The first lot of machinery for the new smelter at Copper Flat has arrived. Thirty miners are still at work developing the ore bodies, with good results.

The company recently organized in New York to develop the Turquoise properties have five men employed in the mines, and beautiful gem stones are being produced.

At Mogollon the Confidence mine is employing about sixty men on development work and in the stopes. An ample supply of ore is contracted to keep twenty stamps of the 30 stamp mill at work.

The Golden Giant Company is working about forty-five men at the mine and mill.

La Belle *Cresset*: The La Belle tunnel is now working two shifts and the 500-foot mark will soon be reached.

The Gusdorf brothers are developing the old Shoshone mine on Gold hill. The shaft they are sinking discloses a 3-foot vein of copper pyrites, which carries an average of over $80 per ton.

Sierra County *Advocate*: At Hillsboro Crumrine & Lindner, the leasers at the Snake mine, have 30 inches of sulphide ore, which runs over three ounces per ton.

ARIZONA.

GLOBE DISTRICT.

(Special Correspondence).—At the Continental mine a contract for 500 feet of a crosscut tunnel has begun. It will cut the main vein at a depth of 300 feet from the apex of the vein or 245 feet from the rim of the present shaft. The shaft will also be continued to a depth of 200 feet which will give the shaft a depth of 250 feet and connect with the tunnel at that depth. The Continental vein at the 50-foot level is 55 feet wide; and though the vein is mostly composed of gossan, the copper being mostly leached out, still the whole of the vein will average 5 per cent copper, three dollars in gold and 8 ounces in silver to the ton and the ore grows richer with depth and the vein continues to widen. It is expected that at the 250-foot level the ledge will be much wider than 55 feet. The development of this mine is being watched with great interest by all mining interests of this district for it promises to become a mine of great importance, perhaps similar in value to the Verde mines of Jerome, Arizona, and the Copper Queen mines of Bisbee, Arizona. A British syndicate has the controlling interest in the Continental group and Mr. Edmont de Stoutz, chemist and mining engineer of Geneva, Switzerland, who is a graduate of the mining academy of Frieberg, Saxony, is here looking after the developing of the Continental in the interest of the English syndicate.

The Black Warrior Copper Company have completed their steam hoist and started sinking of the shaft on the Black Warrior copper claim. A contract has also been let by this for the sinking of the Dateville shaft and the ore looks well.

Mr. Kloustermyer, general manager of the Last Hope Silver Mining Company of Cleveland, Ohio, is in Globe for the last month making preparations for the starting of work on the company's property which lies seven miles northeast of Globe City. The mine known as the Cleveland has a great deal of development work on it and bids fair to produce a great amount of silver.

Globe, Dec. 26th, '96.

(Special Correspondence).—In regard to the experiments of the United Verde Copper Company with sulphide smelting without roasting and without carbonaceous fuel in any form, it is a success, and the company expects to have the plant arranged to treat all the ores in that way inside of four months. They have one furnace running now on sulphide smelting without roasting and without fuel, and are making improvements right along which will lessen the cost. They are making arrangements to handle the ores automatically without much labor. The matte from the sulphide smelting is put direct into the converters, and the copper made from it is nearly pure, 99.40 per cent fine, so you see that copper can be made as pure with less process, and also a great saving in copper with less handling.

Jerome, Dec. 28, '96.

Phœnix *Republican*: The United Verde Copper Company which nearly doubled the capacity of its plant during the past summer is still engaged in enlarging its plant and increasing its capacity.

Yuma *Sun*: The placer property of the Monitor Mining Company, known as the Buck Kelly property, at Gila City, has been sold to Sanderson & Co., of Moberly, Missouri, for $25,000. The purchasers will begin work at once.

There are 350 stamps at present in Yavapai county, and 245 in Pinal county.

At Harqua Hala, Messrs. Calloway and Warer are taking out considerable ore in the Bonanza and keeping the 40-stamp mill steadily working.

The Commonwealth Mining Company at Pearce, Cochise county, employs sixty men and ships to the Pueblo smelters three to four carlords of ore per day. The rock is rich in gold and silver, yielding $100 per ton.

C. D. Lane, of San Francisco, is interesting himself in the purchase of some properties in the Dos Cabezas gold district. Should the transfer be made, a mill will be erected and work begun. It is also stated that a 20-stamp mill is to be erected at Pearce within a few months, for the Commonwealth Mining Company. A mill belonging to Manager Brockman which has been in operation at White Signal, N. M., will be torn down and shipped to Pearce. When depth has been attained on the Gold Cliff, which is located near the Commonwealth, the company also intends to put in reduction works.

Nevada City District Geology.

NUMBER IV.

To the north the bedrock rises slowly, but in a northwesterly direction it continues low, and the ground has been opened by the Knickerbocker and Grover tunnels, in which good pay is found in spots. Still deeper is the Phœnix tunnel, on which the last work was done fifteen or twenty years ago. It is about 1200 feet long, in hard granodiorite, and struck gravel in an upraise of 15 or 20 feet near the end. The gravel did not show good pay. From here on northwestward there are no developments until Ragon's claim and the old Empire shaft are reached. The latter is 146 feet deep, and some rich gravel was extracted from it long ago. The channel has here the character of a narrow ravine. Some good pay has also been found higher up on the rim in Ragon's incline. The same channel is again exposed in the hydraulic cut on the north side of the ridge, in the extreme northwestern corner of the district. Some drifting has also been done at this place, and the pay streak is said to have been 50 feet wide. At Stevens and Trevaski a little hydraulic work has been done in the black gravel, and several tunnels have been run in. The principal one is 420 feet in, with the bottom in bedrock at the face. Another is being driven 16 feet lower, and is 200 feet in, entirely in bedrock. At the northeastern side of Cement hill, near Dean's, several long tunnels have been driven, which, at a certain distance in, lose the bedrock and run into black gravel. Dean's new tunnel is 600 feet in, at an elevation of about 2700 feet, and still entirely in bedrock. Black gravel has been struck in a 20-foot upraise. Under the andesite ridge west of Towntalk there is a channel, the bottom of which has not thus far been exposed. It seems to head near Towntalk, where the presence of a small channel was indicated in the railroad tunnel. The tunnel 1000 feet west of Towntalk was made in 1880 and proved too high. Several tunnels have been run in along the rim on the north side of the ridge. Carl's tunnel was run 1000 feet in bedrock and struck only clay and sand in an upraise. Hughes' tunnel is 500 feet in, in bedrock. Schroeder's tunnel is located at the outlet in a small hydraulic cut just outside the map limit, and drifting was going on there on a small scale in 1894. The elevation there is about 2516 feet.

In the Grass Valley district, the Alta channel has been drifted for about 3000 feet from several shafts. The width of the channel was from 50 to 150 feet, but beyond the Hope shaft it appeared to widen, making the extraction less profitable. The total production is estimated to be $1,000,000.

Along the northern edge of the andesite area, east of the Empire mine, smaller hydraulic cuts have been made and 700 feet of the channel drifted. A small channel southeast of Heuston hill was drifted upon for about 400 feet in 1894.

The alluvial gravels are still occasionally worked in the vicinity of Nevada City and Grass Valley, and a gradual process of re-concentration is going on in them. The gravels of Deer creek will probably be worked again at some future time.

Gold Quartz Veins.—The gold quartz veins are fissures in the bedrock series, filled more or less continuously with quartz carrying native gold and auriferous metallic sulphides. These fissures were formed subsequent to the general metamorphism of the range, and also later than the granodiorite intrusions. They are arranged in several systems, the fissures in each system being approximately parallel. The force producing them had frequently the effect of dividing the country rock into a great number of parallel sheets, from a few inches to several feet thick. Along a few of these fissures considerable faulting took place, but where the rock was extensively divided into sheets the movement on each was probably small. Open spaces varying in width from a fraction of an inch to several feet resulted along the fissures. Solutions of thermal water, charged with carbonates, silica, gold and other metals, entered these fissures, probably ascending from below, and deposited their contents in them, usually also penetrating the adjoining porous and often shattered rock for a distance varying from a few inches to several feet. The effect produced on the country rock was to convert it into a gray or light-colored rock, of greasy feel, consisting of carbonates, white mica and pyrite. The gold is almost invariably concentrated in the quartz which fills the open fissure. The adjoining altered country rock, sometimes referred to as "cab" or "gouge," very seldom contains a paying amount of gold. Shattered zones, or seam mines, in which the country rock is traversed by swarms of minute, often rich, quartz seams, do not occur to any large extent in this district. The pay is chiefly confined to the quartz within the well-defined limits of the walls of the fissure. The ideal vein is a plate of quartz contained between two well-defined separating planes, the foot and the hanging wall. Such veins occur, but the ideal regularity is usually not preserved for any long distance. The quartz may pinch out entirely, leaving as guide only a narrow seam; the space between the walls may contain several smaller veins separated by masses of country rock, or "horses." While in certain mines all quartz may be pay ore, it is usual to find rich and barren quartz alternating. The rich quartz forms irregular, or, more frequently, long-drawn masses, usually with a steep dip on the plane of the vein; these are called ore chutes, or shoots. The width of the pay quartz varies from several feet to a fraction of a foot; the narrower the vein the richer the contents must be to pay. The general tenor of the pay ore of the district varies between $5 and $50, though smaller masses of higher grade are met with. The sulphurets make up from a fraction of 1 per cent to 10 per cent of the quartz mined, and contain from $30 to $100 or $200 per ton.

The veins of the district may be divided into four classes, according to their direction and dip: 1. The Orleans-Idaho system; strike, west-northwest to east-southeast; steep southerly dip. 2. The Willow Valley system; strike, about east to west; dip, medium to flat, northerly or southerly. 3. The Omaha-Empire system; strike, north to south; dip, medium to flat, westerly. 4. The Providence system; strike, north to south; dip, medium, easterly.

(To be Continued.)

Scientific Progress.

Unique Magnetic Experiment.

Some time ago Folgheraiter began testing old Pompeiian and Tuscan vases with the view to determining their polarity, his theory being that they would retain the same direction of magnetization as when baked, and that this would correspond with the magnetic dip at that time. He has now completed, for the present, this investigation. Speaking of this the London *Electrician* says:

A unique interest attaches to this work. It will be remembered that he was trying to discover the magnetic dip, say, at the time of Romulus, by the present magnetization of Tuscan vases. He proved that the clay they are made of is magnetized in the direction of the earth's magnetic force during firing, and retains that magnetism indefinitely after cooling. Some of these vases, notably the wine jugs, *oinochoai*, could only stand upright in the furnace, and might, therefore, serve as self-registering indicators of the magnetic dip. Now, the most curious fact brought to light is that the north-seeking pole of these vases has a variety of dips from 25° above to 25° below the horizon, but never more than that. Hence, our author argues, the dip cannot have been anything like its present value (60° at Florence) at the time of the Roman kings. He is inclined to think that the N.-seeking pole pointed a few degrees above the horizon in the Eighth century B. C., and that the needle was (or would have been, had it existed), horizontal a few centuries afterwards."

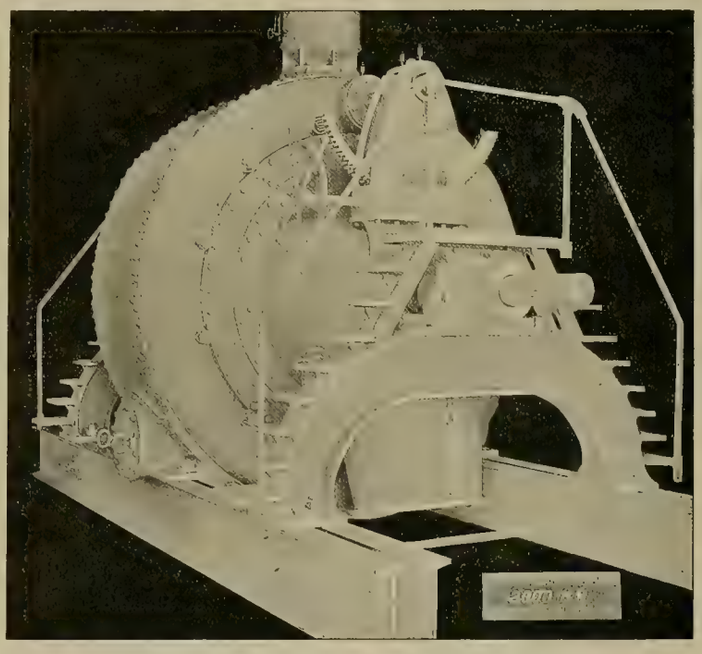
At the annual meeting of the American Society of Mechanical Engineers the president, John Fritz, who spoke on the "Progress in the Manufacture of Iron and Steel in America," said that at Bethlehem they now have lathes which have taken work weighing over 190,000 pounds, and they have planers that have finished castings each weighing 165 tons. Shafts 18 or 20 inches in diameter and 60 to 70 feet or more in length, lying in Vs, can be turned easily by one man with a lever 36 inches long, showing the high character of the work. Fritz next took up the matter of forging. He gave the results of some physical tests to show progress that has been made in recent years. A test of puddled bar reworked car axle gave tensile strength of 44,000 to 45,000 pounds; elastic limit, 18,000 to 23,000 pounds; elongation, 21 to 27 per cent; contraction of area, 40 to 48 per cent. He compared with this results from hollow-forged, oil-hardened and annealed nickel steel shafting, which give: Tensile strength, 95,000 to 100,000 pounds; elastic limit, 60,000 to 65,000 pounds; elongation, 20 to 25 per cent; contraction of area, 55 to 60 per cent. In shafts of any size a nickel steel shaft as above would have three times the elastic strength of a wrought iron shaft, and it would be possible to make a nickel steel shaft of one-quarter the weight of a wrought iron shaft and obtain the same elastic working strength. The modern practice of steel making has, in the hands of the mechanical engineer, the metallurgist and the chemist, wrought wonders in producing material which in quantity, physical qualities and cheapness would have been regarded as utterly impossible half a century ago. To-day we are enabled to use steel for the commonest purposes as well as for the most expensive article produced by the skill of the mechanic. No article is too simple to be made of it and no structure so grand and important as to refuse its service.

As to the age of the Niagara Falls, geologists differ widely in opinion. At first it was estimated that the Niagara river came into existence, through changes in the level of the land around the Great Lakes, about 55,000 years ago. Later this was reduced to only 12,000 years. Sir Charles Lyell increased the estimate again to 35,000 years; but more recently others have lowered it to about 9000 years. The latest estimate is that of Dr. J. W. Spencer, who, basing his conclusions on the most recent investigations, places the age of the river at 32,000 years, and that of the cataract at 31,000 years. At one period, many thousand years ago, the height of the falls was 420 feet.

Electrical Progress.

Niagara Type of Turbine.

In the new electric power plant built by the Niagara Falls Hydraulic Power & Manufacturing Company at Niagara for the purpose of supplying the new aluminum factory of the Pittsburg Reduction Company with power are four wheels made by James Leffel & Company, of Springfield, Ohio, which stand on the floor, and receive their supply of water through 5-foot inlet pipes connected with the penstock. Each wheel has its individual inlet pipe and water supply, and can be operated alone. In the inlet pipes there are 60-inch valves operated by hydraulic pressure. Each wheel weighs about fifty tons; they are supported on double steel beams resting on solid stone foundations. James Leffel & Co. call this wheel their Niagara type. It is illustrated on this page. The *Electrical Engineer* describes it as a double discharge turbine and consists of a large, flattened, vertical, circular casing containing the guide case of the wheel proper. Through the supply pipes below the water is let into this exterior casing, flowing upwards and surrounding the guide case. A series of oscillating guides, which constitute the gates, admit the water to the runner. The discharge pipes project from the sides of this casing, laterally and down by a gradual curve, to draft tubes 20 feet in length, thus utilizing a portion of the atmospheric pressure. The heads of the large casing are made of 3½-inch cast iron and are of curved form and shape. The straight or cylindrical part of the case is made of steel plates ¾ of an inch thick, double riveted to the cast heads. Within this casing and the guide casing the runner or wheel proper is located on a horizontal shaft, which is supported by adjustable ball and socket oil bearings on heavy arched bridge trees exterior to the outer casing. The runner is made of bronze and iron, and is 74 inches in diameter. The buckets are made of bronze, and receive the water by a sharp dividing ridge, the central portion, upon which the shell is fastened, being of iron. The water is discharged from



LEFFEL NIAGARA TURBINE, 2000 H. P.

the wheels laterally into the discharge pipes, and owing to the design of the wheels there is no uncompensated pressure on any part of the wheel, and no end thrust or pressure on the shaft, the whole being in perfect balance wherever it touches water. The head under which these wheels operate is about 210 feet. One of these wheels is driving two electric railways, the Lewiston & Youngstown road, and the Niagara Falls & Lewistown Railway.

WITHIN a few weeks the twelve turn bridges in Chicago betweed Twelfth street and the lake will be changed from steam to electric power. It is claimed the change will save the city $1,000 per month.

Mechanical Progress.

Efficiency of the Boiler Grate.

At the December meeting of the American Society of Mechanical Engineers, William Wallace Christie read a paper on the "Efficiency of the Boiler Grate" in which he made the following conclusions:

I collected the data from 108 boiler tests, paying particular attention to the pounds of coal burned per square foot of grate at which the greatest quantity of water is evaporated.

These tests were all that I could obtain from various sources, and as far as can be ascertained are reasonably authentic.

In fact, the averages probably represent present practice fairly, and are, from both economy and capacity, tests made by the author and others.

From the tables we have the following averages:

Pounds of coal per H. P. developed per hour	3.64
Pounds of combustible H. P. developed per hour	3.04
Pounds of coal burned per square foot of grate per hour	18.16

Professor Rankine says: "The rate of combustion in factory boilers is 12 to 16 pounds of coal to the square foot of grate."

Dr. Thurston says in boiler trials: "In land boilers it is customary to keep the rate of combustion per square foot of grate down to about eight pounds per hour, although it frequently rises to 10 or 12 pounds."

The experiments show that 13 pounds of coal burned per square foot of grate per hour of either anthracite or bituminous coal gives the greatest economy in evaporation.

The greatest amount of anthracite coal found to have been burned per square foot of grate was 33.70 pounds; the least, 4.70 pounds.

The greatest amount of bituminous coal found to have been burned per square foot of grate per hour was 57 pounds; the least, 6.70 pounds.

Land stationary boilers are the only ones considered in the paper.

The pounds of combustible per H. P. per hour was noted especially because of its giving a fairer way of comparing the economy of different boilers, and is, I believe, in accordance with the views of Dr. Emery.

It will be seen that less than 4 pounds of coal in the most of cases is that which is required to be burned per square foot of grate per hour to produce one H. P., and as 13 pounds of coal burned per square foot of grate is a most economical rate of rate of combustion, 13 divided by 4 or 3.25 H. P. per square foot of grate per hour is economically attainable.

The above is for anthracite coal. For bituminous coal, as 23 8 pounds burned per square foot of grate is an economical rate of combustion, 23 8 divided by 4 or 5.95 H. P. per square foot of grate per hour is economically attainable.

The average of 13 and 23.8 is 18.4, which is very near 18.16, the average of all the 108 tests.

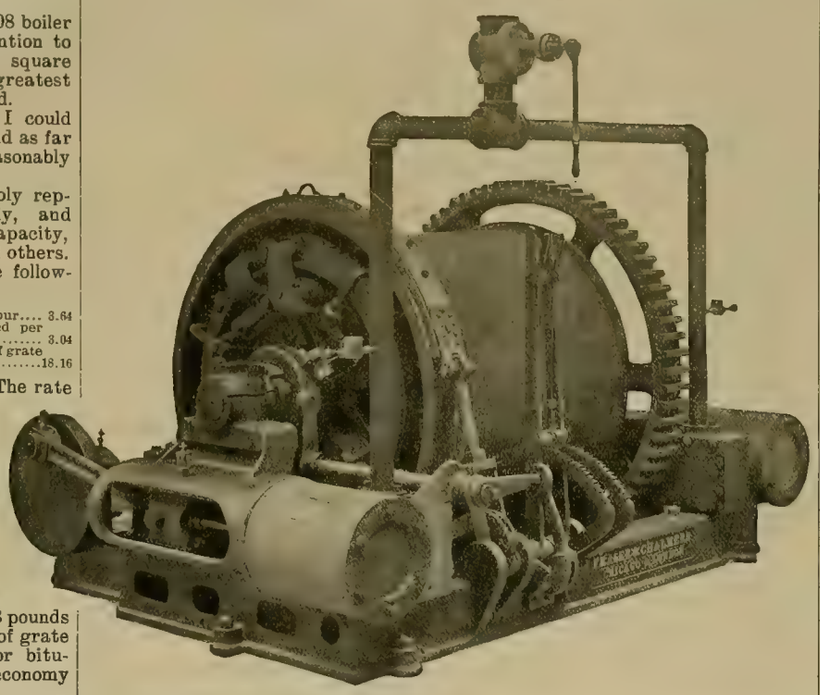
It certainly is understood that the above figures may have need of variance for special coals or conditions, and are only intended to give averages.

The 23.8 is obtained by multiplying 13×1.83 a coefficient subsequently deducted), and 1.83 agrees with Mr. Harris' rule for grate area for bituminous coal burned with natural draft and this is a very economical rate of combustion (23.8) for bituminous coal.

Coals.	Coal per hour, per sq. ft. of Grate	Chimney: Diameter, ft.	Chimney: Height, ft.	Chimney: Area, sq. ft.	Coal per hour, lbs.	Grate Area, sq. ft.	Length of Chimney, dia.
		D	H	A	C	G	
Anthracite Coal Records.	15.00	3.5	80	9.62	1154.4	77	22.85
	15.00	1.75	63.5	2.40	279.3	18.62	36.28
	7.19	1.75	63.5	2.40	133.8	18.62	36.28
	4.71	3	80	9	334	20.25	26.66
	14.89	3.5+	50	10	1191.25	.....	16.00
Average	11.35	.....	.....	.....	.....	.....	.....
Bituminous Coal Records.	30.4	3 1-6	67.5	7.75	1067	35	21.36
	40.4	3 1-6	67.5	7.75	1414	35	21.36
	35.4	3 1-6	67.5	7.75	1241	35	21.36
	33.07	3 1-6	67.5	7.75	1158	35	21.36
	24.56	4 1-6	92	13.63	1179	48	30.66
	22.20	3	67 5	7.75	777	35	21.36
	40.12	3 1-6	67.5	7.75	1404	35	21 36
	29.47	2	75	4	700	47.5	38.50
Average	31 95	.....	.....	.....	.....	.....	.....

Portable Hoisting Engine.

The cut on this page shows a standard portable hoisting engine for hoisting from small mines, or for underground hoisting or haulage, where the output of the mines does not warrant the use of a direct acting engine. The cut shows a single drum hoist, but they are built with two drums and in exactly the same style. The engine frames, cylinders and engine shaft bearings are cast in one piece on the smaller sizes, and, as the guides and cylinder are bored at the same time, there is no chance of getting out of line.



STANDARD SINGLE DRUM PORTABLE HOISTING MACHINE.

On the larger sizes the cylinder is cast separate, to facilitate molding, but it is bored in line with the guides, to which it is bolted with studs and nuts. The two engines are held together by connecting pieces of bedplate, which have finished tongues on the ends, fitting into finished grooves in the engine frames and to which they are firmly bolted. This makes practically a solid piece of the two engines and connecting pieces of bedplate, and makes a machine that the roughest of usage will not throw out of alignment. On account of this construction, no special foundation is considered necessary.

These machines have lately been put on the market by Fraser & Chalmers, Chicago, Ill.

THE longest distance at which the long distance telephone is now practically operated is from Boston to St. Louis, a distance of 1400 miles. This is twice as long as any European line.

Practical Information.

New Sources of Error in Mine Surveys.

Electricity is being used so much in mining operations that it is very important that every mining engineer and surveyor should be made acquainted with the result of some very recent experiments on the effect of electric currents on delicate instruments. In the Westphalian coal fields electric railways are rapidly on the increase, and the question arose whether the electric currents exercised any detrimental action upon the magnetic mine surveying instruments which are used so largely in the German mines.

In order to determine this, Prof. Lenz selected a point underground at a horizontal distance of about 100 yards from the rails of an electric railway, and 1420 feet below it. Then by means of a magnetometer, with quartz fiber suspension, a series of observations of variation were made, based on a fixed line. The day curve was very irregular, while the night results displayed perfect regularity, and were in accord with the magnetic records.

This exhibited that magnetic observations can, under such conditions, be only satisfactorily conducted during the night, in the absence of the magnetic current. Another source of error is the safety lamp. Composed of various metals, the lamp in a hot condition sets up thermo-electric currents which act on the magnetic needle.

In order to obtain information on this point six mine surveyor's safety lamps, free from iron, were placed one at a time, first in a cold condition and then heated, at a pole of a sensitive magnetometer. Of the six lamps, two, when cold, had no action on the needle, while all acted on it when hot. The deviations observed amounted to from 30 seconds to 100 seconds.

A new benzine lamp, that had not been previously used, caused a deviation of as much as 5 minutes. The deviation increased with the temperature of the lamp. A new aluminum safety lamp caused the same deviation when cold as when hot. From these results it follows that the mine surveyor, before making magnetic observations with delicate instruments, should carefully test his lamp. The influence of slight magnetic properties may be lessened by holding the light in the prolongation of the magnetic axis. With side lighting great care is necessary. It is thus demonstrated that the mining engineer and surveyor should make their observations at night. If they carry out that operation during the daytime in the neighborhood of an electric plant, etc., the results are almost certain to be wrong, and trouble will ensue.—W. A. Engard in the Colliery Engineer.

Things That Are Near.

Flying is solved. The principle is known. A mechanical expedient is all that is now needed to make it successful. Practical flight is to-day not more than five or ten years off.

A glow worm makes light with about one three hundredth part of the force used in ordinary artificial light. When men know how to make light as cheap, streets and homes will be as light as day for a mere fraction of what light now costs. This is near. Vacuum illumination without incandescence is already in full operation, and in a year or two should cut down the price of light to a sixth of its current cost, and in five or ten years light may be, like water, turned on in every house at will.

Compressed air has long been known to be the best way, theoretically, to store force for use in transportation. There is no waste and no deterioration. The need is a cheap and efficient motor to apply compressed air to city transportation.

DURING 1896 only 1802 miles of railway were built in the United States, the smallest mileage in any year since 1875. The number of lines on which this track was laid is 163—11 less than the number of new lines added in the previous year. Track was laid in thirty-eight of the States and Territories. California had 167 miles on eight lines, Louisiana 154 miles on five lines, Michigan 146 miles on eleven lines, Georgia 97 miles on fourteen lines, Pennsylvania 90 miles on fifteen lines, Wisconsin 86 miles on seven lines, and Texas 83 miles on eight lines. Many railway enterprises were under way early in the year which would have added hundreds of miles of track, but were stopped by the financial agitation preceding the election. The building of fully 2500 miles would have been the record of 1896 but for the political uncertainty.

OF the three great ship canals built within a comparatively recent period, the Baltic, with its sixty-one miles of canal, depth of nearly 30 feet and width of 89 feet, consumed eight years in construction and cost nearly $38,000,000; the Manchester canal, with its fifteen and one-half miles of channel, 26 feet depth and 120 feet width, took six years to build, and cost in the neighborhood of $77,000,000; and now the estimates of the Chicago canal are twenty-eight miles of channel, a depth of 35 feet and width of from 160 to 210 feet, costing less than $29,000,000.

TO RESTORE burned steel tools to their former usefulness they should be heated to a bright red and then allowed to cool off in a mixture composed as follows: Melt 500 parts of tallow and 120 parts of black pitch together and add gradually, under continuous stirring, 375 parts of pulverized sal ammoniac, 125 parts of ferrocyanide of potash, 20 parts of soft soap and a handful of common salt. In the case of larger tools heating and dipping should be repeated.

ACCORDING to the report of the Bureau of Statistics of the United States, the exports of gold and silver for October, 1895 and 1896, and for ten months ending October 30th, 1895 and 1896, were as follows:

	October		Ten Months Ending October	
	1895.	1896.	1895.	1896.
Gold—				
Imports	$1,797,040	$27,961,083	$30,636,979	$92,849,939
Exports	1,873,897	343,168	75,064,179	55,913,589
Silver—				
Imports	1,391,831	993,440	9,372,495	9,448,077
Exports	4,594,447	4,794,339	43,259,057	51,235,380

A MATHEMATICIAN has computed the movements of a rider's feet while working a bicycle, and has demonstrated that it requires less exertion to travel fifteen miles on a bicycle than to walk three miles.

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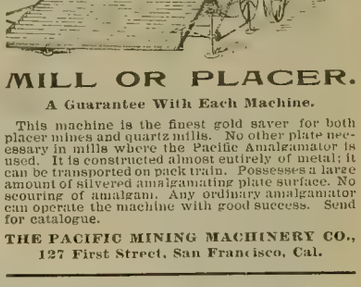
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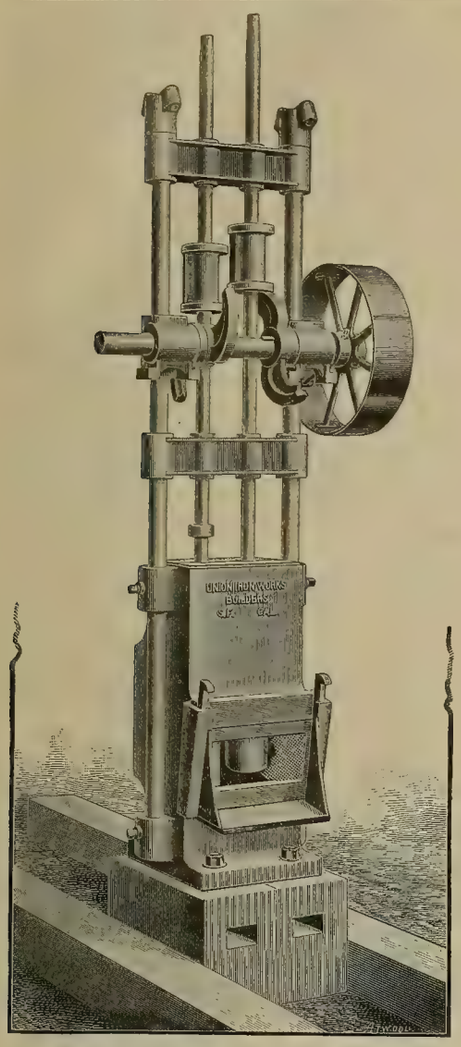


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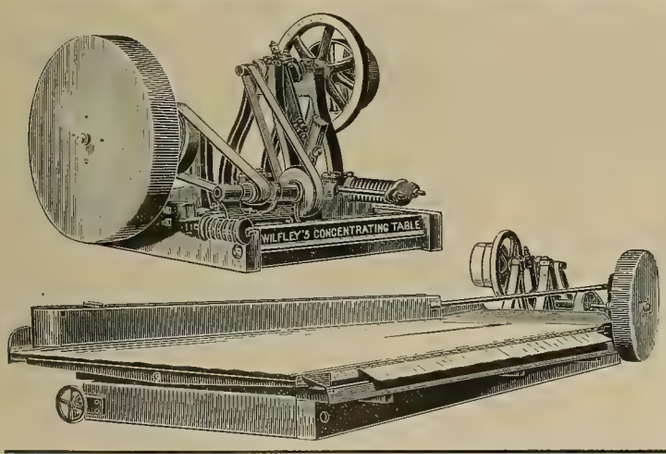
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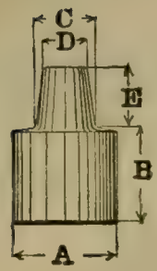
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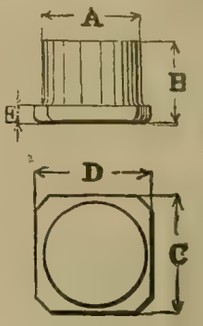
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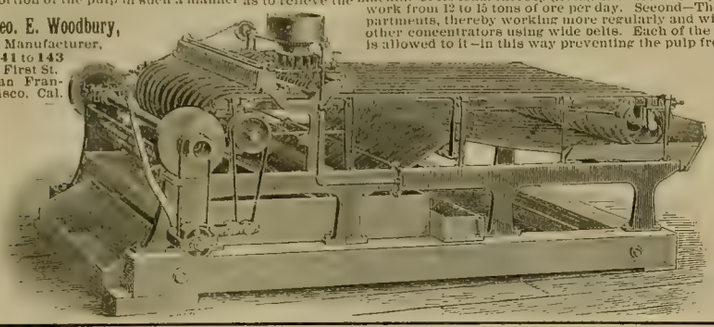
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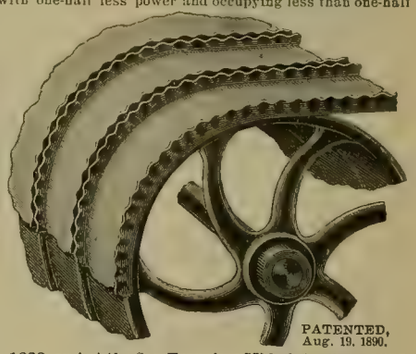
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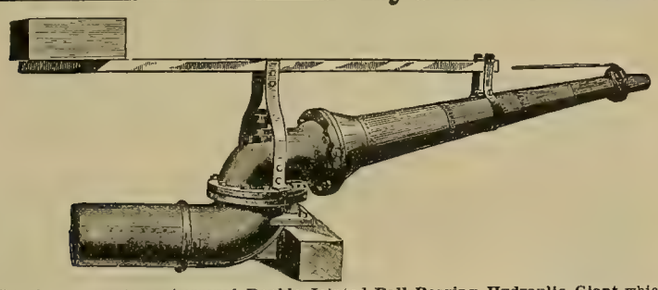
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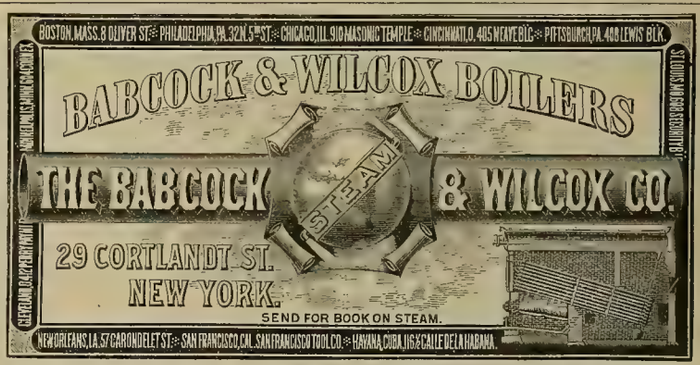
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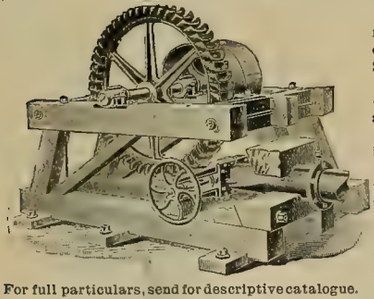
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Coast Industrial Notes.

—The Selma, Cal., flouring mill was destroyed by fire last week. The loss was $42,000.

—The Southern Pacific Company will pay a dividend of one-half per cent on the stock of the Central Pacific Railroad.

—Victoria, B. C., aldermen have voted to issue $125,000 in bonds for a new steel bridge with three spans of 217 feet each.

—Claus Spreckels has 250 people employed at his Watsonville, Cal., beet-sugar factory at wages varying from $2.50 to $4 per day.

—The Central Pacific Railroad earned net for October $613,468, an increase of $51,680; from January 1st to October 31st, $4,003,287; increase $21,644.

—The San Francisco and North Pacific road earned net for November $20,000, an increase of $3,592, and from July 1st to November 30th $142,630, decrease $11,827.

—The Southern Pacific Company earned gross for October $5,179,912, a decrease of $168,303, and net $2,321,970, decrease $58,205. The gross earnings from January 1st to October 31st were $31,378,604, a decrease of $1,504,357; net $13,354,424, decrease $179,054.

—The Sunset Oil Company has incorporated in Fresno, Cal., "to develop petroleum, sulphur, gypsum and other mineral lands." G. L. Warlow, J. B. Rader, M. McWhorter, G. W. Smith, C. J. Miner, W. D. Creighton, Fresno. Capital stock, $100,000; subscribed, $15,700.

—The Santa Fe Railway management is considering a plan of substituting gasoline power for steam power in the operation of the 1000 water tanks on its system. It is said that the change will enable the company to make a saving of $50,000 a year. An experiment will be made this month, and if it proves successful, the change will be made.

—The Great Northern Railroad is reported to have a surveying party running a line for the construction of a branch road into the British Columbia mining region next summer. The company, it is said, has two routes under consideration, one a rail line between Bonner's Ferry north along the Kootenay river to Kaslo, terminus of the Kasio & Slocan, another to build across Trail Creek country to a point near the Spokane & Northern, on the line between Spokane and Nelson.

—H. C. Henry of Seattle, Wash., has the contract to build the approaches to the Great Northern Railroad's tunnel through the Cascade mountains in western Washington, and men are on their way to commence preliminary work. It will take about six months to do the work, and then everything will be ready to commence on the track, which will be one of the greatest engineering feats in Pacific coast railroading. The tunnel will be two and a half miles long, and will reduce the altitude of that part of the road 1000 feet.

—The officials of the Denver & Rio Grande Railway are considering the possibilities of the California & Nevada Railway, and it is possible that the narrow-gauge line may pass into their control. At the request of Charles Smith of Denver, who has the first mortgage bonds of the line, Receiver King has prepared an extended report on the road, and copies of the document have been sent to Denver. The report points out that the little 22-mile line offers one of the few openings still left by which San Francisco may be reached from the Alameda side of the bay. The creek and the land in the vicinity of West Oakland are covered with a network of tracks, and any more franchises seem to be precluded.

—Last week electricity was brought into Sacramento over the new line of the Central Electric Company from its power house at Newcastle, Placer county, thirty miles distant, the power being furnished from the reservoirs of the South Yuba Water Company. Three high potential wires carry the current to the station in Sacramento, which is furnished with two motors and two arc light dynamos, which will run 120 arc lights. It has also eight step-down transformers to reduce the voltage, and the switchboard is furnished with several of the latest improvements. Last week a current of 15,000 volts was turned on at Newcastle to test the line, and it was found to be in perfect order clear to that city.

—The following regarding importations at frontier ports of Mexico is of interest to shippers: Packages of merchandise must contain only one mark and number, to facilitate identification. Difference exists between net weight and legal weight. Net weight represents the intrinsic weight of the merchandise itself, while legal weight includes all kinds of interior packing. The customs tariff states plainly when duties are to be charged on net weight, and on legal weight. The metric system went into effect in Mexico September 1st. As a misapprehension seems to exist among American shippers as to the classification of machinery, it is to be noted that all articles, even when imported with machinery, and forming part therof, but which can be put to another use than that for which they were designedly imported, must pay the duty as set forth in the tariff. Extreme care should be taken to give the exact number of the packages shipped. Any excess over the number specified in the manifest will incur heavy penalties, which are always rigidly enforced. When shipping goods in bond, see that the proper entry be made at the custom house or port of shipment, so as to allow of the importation into Mexico without making new entry at the United States custom house at the frontier.

Recent California Mining Incorporations.

War Eagle M. and M. Co., S. F.: B. W. Haines, R. Barnett, W. R. Hall, W. J. Palmer, J. H. Lewis; capital stock $100,000; $40,000 subscribed.

Commercial Paragraphs.

THE Truax Manufacturing Company of Denver, Colo., has just filled an order from Mexico for 6 No. 21 B ore cars and 48 sets of wheels and axles.

HENDRIE & BOLTOFF of Denver, Col., have a contract for supplying the 24-inch iron pipe for the North Denver public sewer, at their bid of $32 per ton, delivered on the ground.

THE Hercules Gas Engine Works have completed a 25 H. P. milling engine for the Randsburg district, to be used in a new 10-stamp mill now being erected. The engine is designed to specially withstand the severe conditions existing in the desert country.

THE contract for the new plant of 120 stamps, with both steam and electrical power for the Diamond Hill gold mines in Montana, has been awarded to the Union Iron Works of San Francisco. The electrical plant will be built complete from the foundation by the General Electric Company of New York. The electrical power will be manufactured at Crow river, 14,000 feet from the mill, and be transmitted that distance over seven wires. A large Rand air compressor with capacity of ten drills will be used, driven by electricity. The power will be delivered at the mill over eight motors, so that one-half the plant can be closed down while the other half is running. The main building will be nearly 300 feet in length. The rock breaker at the mouth of the main tunnel has a capacity of 60 tons per hour. The stamps will be 1000 pounds each. This mine will have a capacity of 500 tons daily. A cyanide plant for reducing the concentrates, with capacity of 30 tons daily, will be connected.

A SYNDICATE in which the officers of the American Cyanide Gold and Silver Recovery Company of Denver, are interested, purchased last summer the Young America mines and mills in Sierra county, California, and built a 100-ton mill to work the ores of that property. They have been operating the mill the past few months successfully and turning out gold bullion. The di-oxide-cyanide process, controlled by the American Cyanide Gold and Silver Recovery Company, has made an extraction at this mill of over 95 per cent of the values of the tailings. Captain J. R. DeLamar is operating this process at the DeLamar mines in Nevada, at a mill having a capacity of 220 tons per day. Captain DeLamar has closed a contract with the American Cyanide Gold and Silver Recovery Company for right to operate this process in a new mill which he is about to erect at the Golden Gate mines, in Mercur district, Utah, which, it is claimed, will be the largest cyanide mill in this country—400 tons per day. Another mill using this process is being operated in Kittitas county, Washington. The ores of the latter region are treated to a very high extraction by this process. The Wiswall-Frank Precipitation process is being used in connection with the di-oxide-cyanide process at all the mills above named.

Personal.

F. H. MILLS of Calumet, Mich., is the new manager of the Merced G. M. Co. at Coulterville, Cal.

CHARLES BUTTERS is in Cripple Creek, Colorado, and expects to reach San Francisco about the middle of January.

THE Nevada, Cal., *Transcript* of Dec. 24, in a long article, pays a just tribute to the zeal and efficiency of Fred Zietler, superintendent Champion mine.

D. H. JACKSON, superintendent of the Larkin mine, who has been in poor health for some time past, has resigned his position and returned to his home in Oakland to recuperate.

RUSSELL L. DUNN, who left San Francisco in August for Siberia to examine and report upon some gravel properties for a Parisian syndicate, was at last mail dates at Gorbitza, on the Chilka river, a branch of the Amoor, in Siberia.

Recently Declared Mining Dividends.

Pennsylvania Mining Co., Grass Valley, Cal., $2,675; payable December 28.

Homestake, South Dakota, $31,250, payable Dec. 26th, a total to date of $6,087,500.

Morning Star Gravel Mining Co., Iowa Hill, Placer county, Cal., Dec. 28th, dividend No. 73, $6 per share, payable immediately.

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Millions Upon Millions of Dollars in Gold Have Been Added to the World's Wealth.

It is a well-known fact that the richest and most famous gold mines in the known world are those of Colorado, many of which are paying to fortunate investors millions of dollars annually in dividends. Some shrewd persons who invested only a few dollars are now receiving hundreds and thousands in profits, and, judging from present indications, there are more desirable chances to invest just now than ever before. New mines are discovered daily and old ones strike richer veins of gold.

In order to meet the great demand for reliable information about mines and mining camps, one of Denver's oldest and best known publishers has just issued a handsomely illustrated book accurately describing every mining camp in the entire State of Colorado, giving scores of truthful photo-engravings of famous mines, mountains, cities, etc. Cripple Creek, the world's wonder, is fully described; also a correct map of the district. Narratives of how many poor people have become wealthy by judicious investments in gold mines, and sketches of former prospectors who are now fixed for life. Tells how to avoid unscrupulous brokers and sharpers. The volume has been carefully compiled by a disinterested author and every statement made is guaranteed to be true. All terms and phrases of miners fully explained; tables showing the State's production of gold and silver for 35 years past. The publisher will send by return mail a copy of the above great book upon receipt of $1 (currency or stamps), which also includes a full-paid yearly subscription to his big 56-column weekly family paper, the *Illustrated Sentinel* of Denver, Colorado (established 1890). Clubs of 6 and six books, $5. The paper contains each week all the latest mining news and illustrations of Rocky mountain scenery, also true stories of love and adventure.

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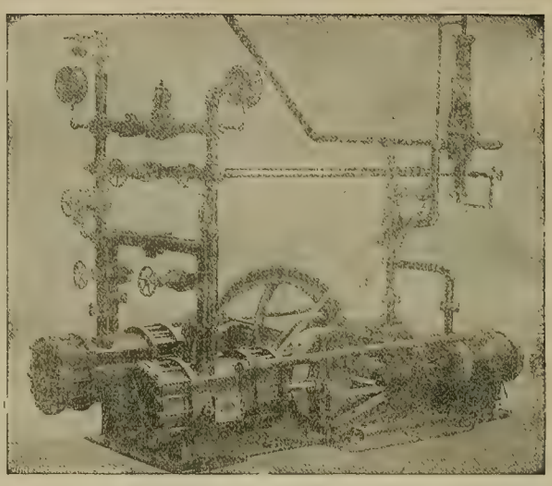
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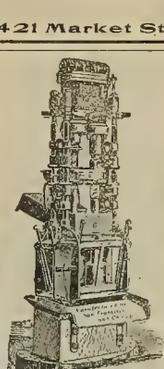
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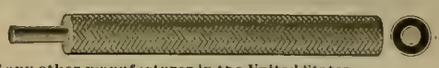
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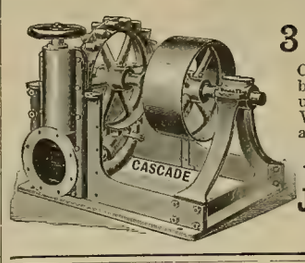
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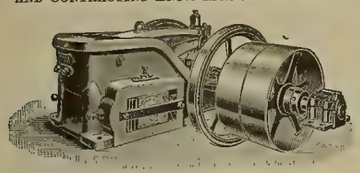
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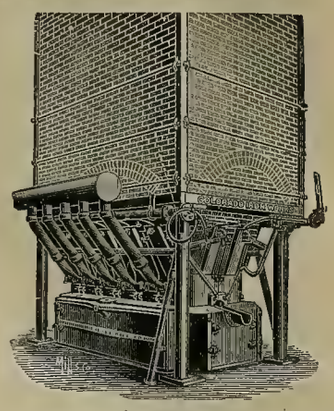
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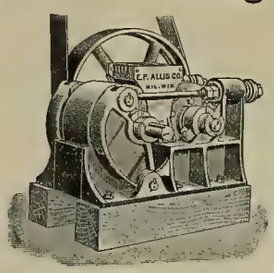
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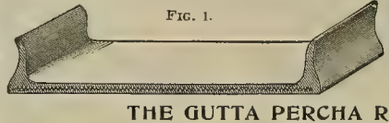


FIG. 1.

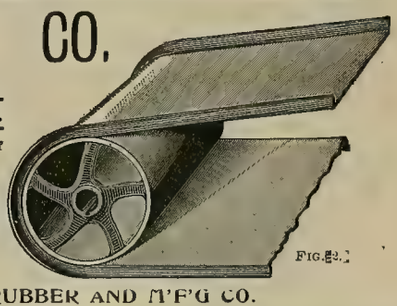


FIG. 2.

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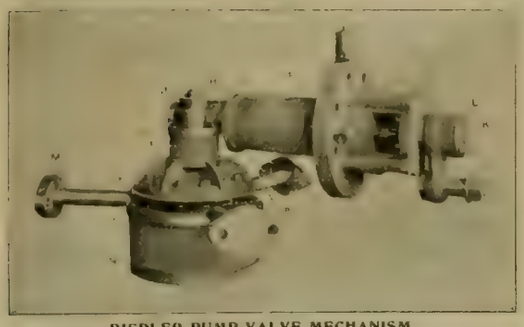
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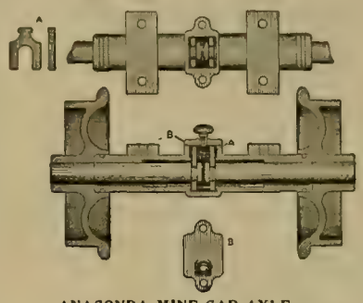
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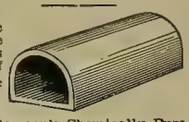
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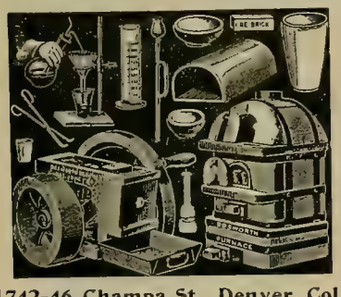
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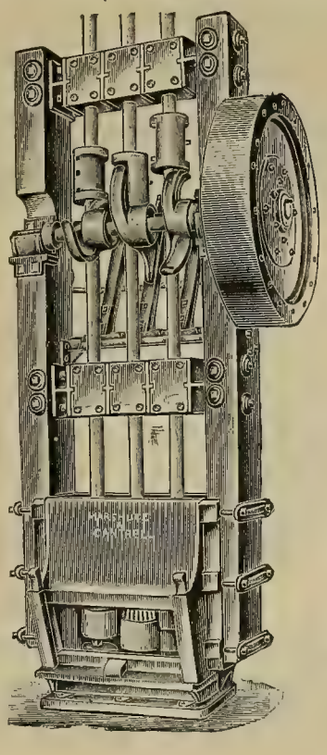
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Success or failure depends upon profitable advertising. Our patrons find an investment in our columns a profitable one.

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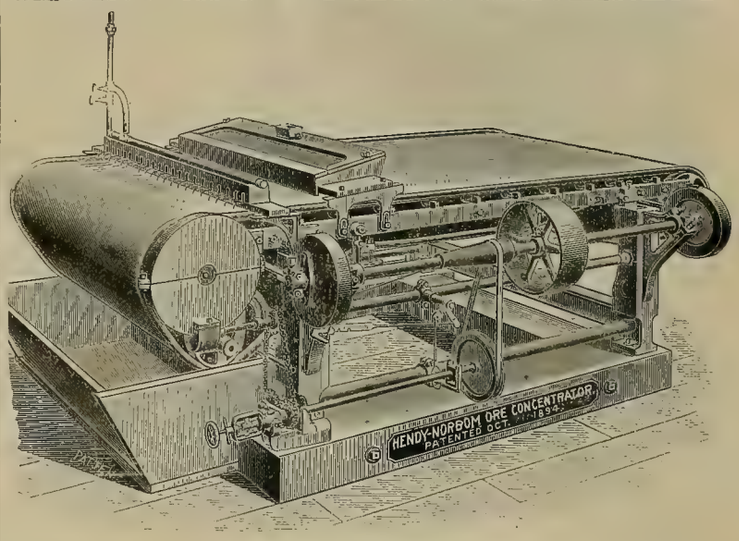
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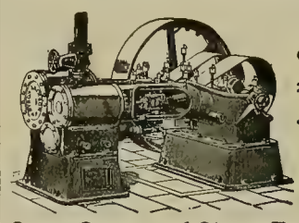
Office of G. McM. Ross, Superintendent Webb Gold Mining Company,
Brown's Valley, Cal., September 14, 1896.

Mr. John O. Norbom—Dear Sir: I have been using your Concentrators at our mines in Brown's Valley and am pleased to inform you that they are in every respect thoroughly satisfactory. When erecting the plant at the above-named place we built Canvas plant, but since putting in your Concentrators we have but little use for that. The percentage of sulphurets now being handled is from 1½ to 2 per cent, mostly galena and iron pyrites, and crushed fine. We save from the pulp over your machine 98½ per cent, and it hardly pays for the labor on the Canvas plant. The motion given your Vanner by its delicately constructed curved springs renders it a perfect machine, and in my estimation it is but a short time before it will replace all other machines of a like nature now in use.

Yours very respectfully, F. W. Page, General Manager.

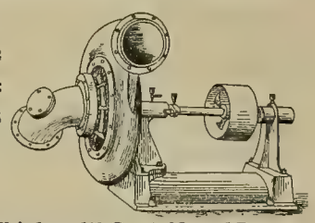
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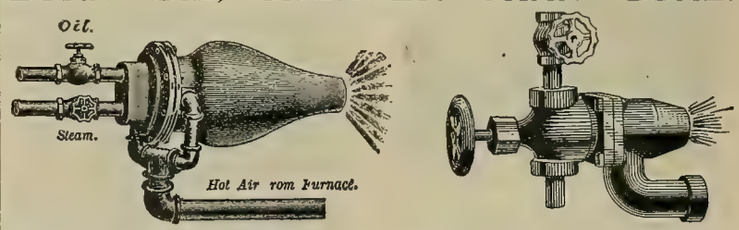


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Yours truly, (Signed) J. R. DeLAMAR.

HOW 10 GRIFFIN MILLS WORK.

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These strong letters coming from such representative men are conclusive evidence that we are right in claiming that the "Griffin Mill" will produce a larger amount of finer pulp at less cost than any other stamp or pulverizer made.

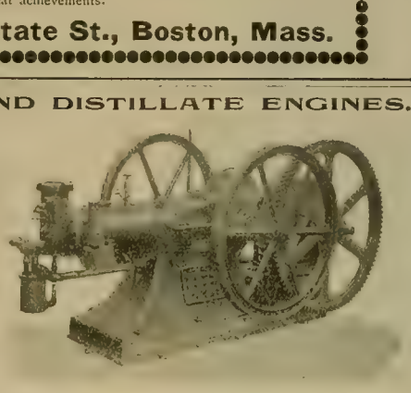
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We claim **full power, automatic and positive adjustment regulating speed and consumption of fuel** in proportion to work being performed. **No spring electrodes to burn out. All springs are outside. Point of ignition, speed and amount of fuel can be changed while engine is in operation.**

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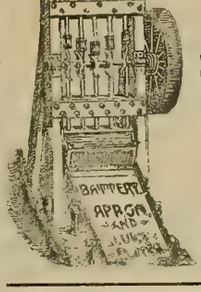


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The names of the great bonanzas of Tintic, the Mammoth, Centennial-Eureka, Bullion-Beck, Eureka Hill and Gemini are recognized everywhere that the mining industry is known. The four former have each a record exceeding $1,000,000 in dividends and the latter of over $600,000.

Until within the last two or three years no adequate means of reduction of Tintic ores was in operation in the district and the production of the mines was limited to those ores sufficiently rich to be shipped to the smelters for treatment, but this has been changed by the erection of immense combination and concentration milling plants which can work at a profit those immense deposits of low grade ores which fill all the producing mines of the district. Four of these mills are in active operation, and three others will undoubtedly be erected within the next year.

The ores of Tintic are greatly diversified in character. The principal metals produced are gold, silver, copper and lead. In silver production Tintic leads the State, while in the production of gold it stands second on the list. Beside the big bonanzas above mentioned there are some twenty-five or more properties that now and in the past have been producing mines, and to these may be added a score of others which have paid for their development by their products, and upon which the recent revival of the mining industry has had the effect of a recommencement of operations.

Tintic has four thriving towns—Eureka, the business center of the district, with a population of 2,500; Mammoth, population 1,000; Robinson and Silver City, 500 each, all of which offer great inducements for investments in a business way.

At the base of the foot hills only a few miles away, is a valley of 25,000 acres of choice fruit and garden lands, watered by the Mt. Nebo Land and Irrigation Company.

As to the future of Tintic, it is no exaggeration to say that it possesses the brightest prospects of any mining district in Utah, and offers to the prospective inventor opportunities which cannot be excelled.

The Rio Grande Western Railway has a double daily train service between Salt Lake City and the Tintic Mining District. For further particulars apply to F. A. WADLEIGH, General Passenger Agent, Salt Lake City.

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Table of Contents:—Preface; Introduction; Implements; Assay Balance; Materials; The Assay Office; Preparation of the Ore; Weighing the Charge; Mixing and Charging; Assay Litharge; Systems of the Crucible Assay; Preliminary Assay; Dressing the Crucible Assays; Examples of Dressing; The Melting in Crucibles; Scorification; Cupellation; Weighing the Bead; Parting; Calculating the Assay; Assay of Ore Containing Coarse Metal; Assay of Roasted Ore for Solubility; To Assay a Cupel; Assay by Amalgamation; To Find the Value of a Specimen; Tests for Ores; A Few Special Minerals; Solubility of Metals; Substitutes and Expedients; Assay Tables.

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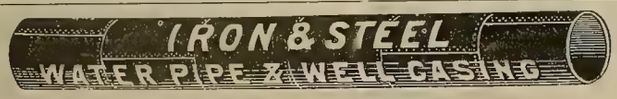
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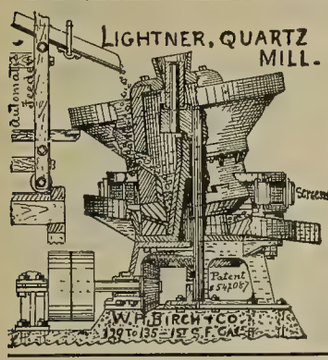
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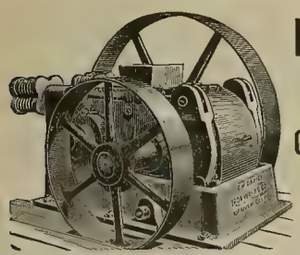
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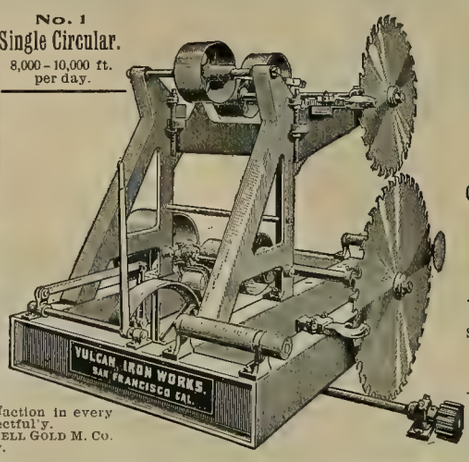
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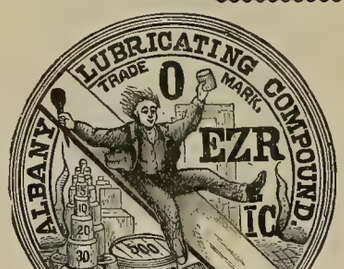
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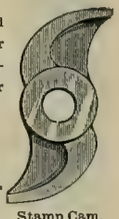
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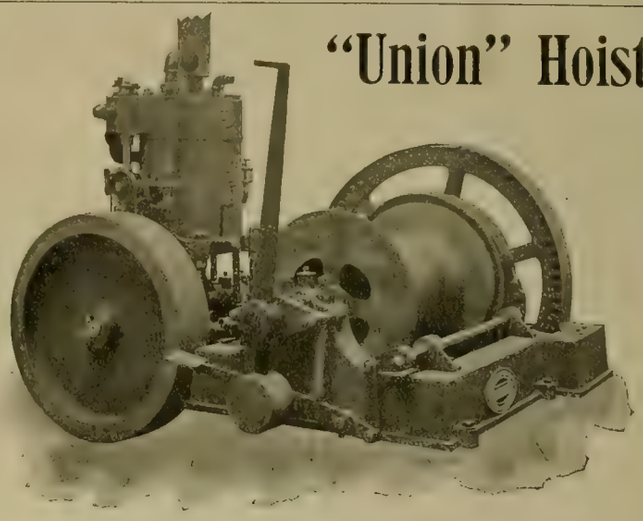
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Market Reports.

The Markets.

SAN FRANCISCO, Dec. 31, 1896.

Mid-winter holidays, stock taking and general rain storms have had their influences on business, but the groundwork is being laid for pushing business for the spring trade. That the outlook is of the most flattering character is conceded on all hands. The agricultural industry promises a larger outturn of farm, dairy and orchard products than has been the case for several years past. This is made possible by more outdoor work having been done and bountiful precipitations at the right time. The ground is soaked to a greater depth than for all of five years, which gives assurance of a water supply during the most trying season for growing crops. The deposit of snow on mountain ranges is said to be above the average of the past half-decade, which will give a good supply of water for mining purposes well towards the close of the summer months. With the above leading industries greatly benefited, there can be no question of its having a favorable influence on all branches of manufactures and trade in general.

The local money market continues to work on easy lines, which is quite a departure from the closing week in former years. This ease shows that bank failures in the Middle States have no unfavorable effect with us and points to a general easing in the rates of discount after January. We are informed that the banks have a liberal supply of available funds which will be added to on quite a large scale after the January disbursements. In this city there will be paid out next month by the National Government, State, municipalities and incorporated companies sums of money aggregating several million dollars. While considerable of this will be sent out of the city, yet the bulk will remain here for investment.

At the East advices continue to come to hand of bank failures, but singular to state this has not caused many failures with either merchants or manufacturers, which should be convincing proof that the banks were not moneyed on conservative lines and therefore their suspension did not cause much surprise. Aside from this it shows that the other banks were well provided with funds so as to tide customers of suspended banks over an emergency. Then there is another consideration which looks quite favorable and that is the improved prices for grain made it possible for the trade to make closer collections by which they have been placed in better financial position. In commenting on the New York money market a leading exchange at that city says: "Money brokers are unanimous in their statement that recent bank failures have failed to affect the local market in any appreciable extent. There is not the least approach to apprehension or excitement in this market, and the demands for currency for the west have been so small as to have been without any power to affect banks here. It would take, in the opinion of some good authorities, the loss of at least $10,000,000 of the surplus reserve to improve money rates at this centre permanently. So far as can be seen, there is very little probability of any such loss, and there is all the time hanging over the market the payment of interest on Government debt at the beginning of the year, greatly increasing the supply of funds."

New York Silver Prices.

NEW YORK, Dec. 31.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
*Friday	....	....
Saturday	29 15-16	65¼
Monday	29⅞	65⅛
Tuesday	29⅞	65⅛
Wednesday	29⅞	65
Thursday	29⅞	65

*Holiday.

	Copper.	Lead.	Iron.	Tin.
*Friday	.....	.....	.....	.....
Saturday	11 40	3 05	11 00@13 00	13 00
Monday	11 40	3 05	11 00@13 00	13 00
Tuesday	11 45	3 02½	11 00@13 00	12 50
Wednesday	11 45	3 02½	11 00@13 00	12 50

*Holiday.

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	12½c Prem
New York Telegraphic Transfer	15c Prem
London Bankers' 60 days	$4.84½
London Merchants	$4.84
London Sight Bankers	$4.88
Refined Silver, per oz., 1000 fine	65⅛
Mexican Dollars	51¼@52¼

SILVER.—The market has shaded off slightly in sympathy with a decline in London. The lower prices there are due to authentic advices that the India Council will offer on the market, next week, £1,500,000 Council bills. It is also unfavorably influenced by the usual mid-winter slow demand. At this writing it is hard to forecast the immediate prospects but it ought not to create surprise if slightly lower prices rule sometime in January, which, if it be the case, ought to be followed by an advance when the usual February and March demand sets in from India, the Straits and the Orient. The steamer Belgic sailed Tuesday for Japan and China with $278,900 in silver bullion.

MEXICAN DOLLARS.—The market was fairly active up to Monday under a demand for shipment to the Orient. The Belgic which sailed last Tuesday took out 351,983 dollars.

ANTIMONY.—Our market is quoted at 7½@8c in a jobbing way. New York mail advices quote 7¼c for Cookson's, 6½@6¾c for Hallett's and 6½c for Japanese.

QUICKSILVER.—The market has held to steady prices throughout the week. Shipments to Mexico and Central America aggregate the past week 250 flasks.

The market is quoted as follows:

Domestic trade, per flask.....36 50

For export, quotations are nominal but less than for home.

COPPER—The market has a strong tone, with sellers indifferent except at an advance. The East reports a continued free export movement, with the markets firming up.

John Stanton reports the copper production in the United States and of the foreign mines and of the United States exports as follows, in gross tons of 2240 pounds:

	Reporting mines.	Outside sources.	Total U.S. pdt.	Product foreign mines.	U. S. exp'ts
First h'lf '95	70,612	9,100	79,712	42,484	34,215
Sec'nd h'f '95	84,885	6,600	91,485	43,674	30,507
Total 1895	155,497	15,700	171,197	86,178	64,722
January, '96	14,372	1,200	16,072	6,834	8,166
February	16,316	1,200	17,516	7,096	8,296
March	16,722	1,200	17,922	6,910	10,892
April	15,912	1,200	77,112	6,865	10,684
May	15,533	1,200	16,733	7,495	10,481
June	14 825	1,200	16,025	7,055	9,797
First h'lf '96	94,180	7,200	101,380	42,255	58,216
July	15,395	1,200	16,595	7,847	10,885
August	15,600	1,200	16,800	7,022	9,119
September	15,777	1,200	16,977	7,182	10,898
October	16,958	1,200	18,158	7,297	11,371
November	15,165	1,200	16,365	7,106	12,034

During the first 11 months of the current year the production has been 186,275 gross tons, of which 112,523 tons, or 60 per cent was exported. In 1895 the production was 171,197 tons and the exports were 64,722 tons, or 37.8 per cent. The quantities retained for home consumption were therefore 106,475 tons in 1895, against a rate to date of 74,000 tons for 1896.

Ingot, jobbing	14¼@—
Ingot, wholesale	13½@—
Sheet copper	17 @—
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17c
Lake Superior Sheathing	20

LEAD—The market is slightly easier, but not quoted lower. At the East, under slightly more selling, more ease is reported.

Pig	—	@	3 75
Bar	—	@	4 00
Sheet	—	@	5 25
Pipe	—	@	4 50

SHOT.—There is a good seasonable demand. Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 20
Drop, B and larger sizes, " "	1 45
Buck, Balls and Chilled, do, " "	1 45

BORAX.—There is nothing new to report either in our market or those at the East. The market is quoted as follows:

Refined, in car lots	5
Refined, in sacks	4¾
Powdered, in car lots	4½
Concentrated, "	5

TIN.—Pig is a shade lower in sympathy with lower prices for silver. The demand for both pig and plate is slack.

Pig, per lb	14¼c@	—	
Plate, I C coke, heavy, per box	—	@	$4 05
" " " light, "	—	@	3 95

IRON.—Our market for both pig and merchantable bar is practically unchanged. The call is slow. Eastern advices regarding pig iron are decidedly mixed. From all advices at hand it looks as if there will be strong competition selling for some weeks, or until a combination of the leading interests can be formed. The export movement of southern continues on a free scale.

We quote as follows:

	To Arrive.	Spot.
AMERICAN.		
Sloss	$21 00	$23 50
Thomas	22 00	23 50
Salisbury	30 00	33 00
ENGLISH.		
Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

LUMBER.—There is a continued free export movement. The domestic demand is slow.

Redwood, Fluming	17 00	@	— —
Pine	14 00	@	19 00
Spruce	26 00	@	31 00

NAILS.—The market is essentially unchanged. The market is quoted as follows:

Wire, carloads, basis per keg	....
" jobbing, " "	$2 75
Cut, carloads, " "	....
" jobbing, " "	2 50

COAL.—The market continues to strengthen for steam which has its influence on household. The light shipments on the way and very little, comparatively, to arrive within the next sixty days will probably cause still higher prices for cargoes on passage. There is a fair consumption demand.

SPOT FROM YARD—PER TON.			
Wellington	$7 50	@	8 00
Greta	6 00	@	6 50
Nanaimo	6 50	@	7 00
Gilman	5 50	@	6 00
Seattle	5 50	@	6 00
Coos Bay	—	—@	5 00
Cannel	—	—@	8 00
Egg, hard	12 00	@	13 00
Wallsend	—	—@	6 50
TO ARRIVE—CARGO LOTS.			
Australian			5 50
Liverpool Steam			6 25
Scotch Splint			— —
Cardiff			6 25
Lehigh Lump			9 00
Cumberland			13 00
Egg, hard			10 00
West Hartley			6 50

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 00	@	— —
" spot, in bulk	9 00	@	10 00
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

POWDER.—The demand is good for the season of the year. The market is quoted as follows:

Hercules, No. 1*, per pound	11¼c
" " No. 2, " "	8½c

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.		Secretary.
Alta S M Co, Nev	54	5c	Dec 14	Jan 18	Feb 8	J E Jacobus, 309 Montgomery
Bullion Con G M Co, Cal	10	10c	Nov 30	Jan 11	Feb 10	C A Grow, Mills Bldg
Channel Bend M Co	5	2c	Nov 9	Dec 12	Jan 2	J P Langhorne, 39 Sutter
Con Cal & Va M Co, Nev	7	25c	Dec 8	Jan 14	Feb 4	A W Havens, 309 Montgomery
Crown Point G & S M Co, Nev.	69	10c	Dec 9	Jan 13	Feb 3	Jas Newlands, Mills Bldg
Eureka Con Drift M Co	5	5c	Nov 24	Dec 28	Jan 18	D M Kent, 330 Pine
Exchequer M Co	39	5c	Nov 14	Dec 17	Jan 11	Chas E Elliott, Nevada Block
Gould & Curry S M Co, Nev	80	15c	Dec 14	Jan 19	Feb 9	A K Durbrow, 309 Montgomery
Hale&Norcross S M Co, Nev.	110	25c	Dec 8	Jan 11	Feb 1	R U Collins, 331 Pine
Hartmann Mining Co, Cal	1	5c	Dec 22	Feb 1	Feb 23	G W Peer, 4 Montgomery
Horsefly G M Co	1	25c	Nov 4	Dec 21	Jan 20	R T Ward, 610 Clay
Jamison M Co	9	5c	Nov 27	Jan 25	Mar 22	Sam W Cheyney, 120 Sutter
Occidental Con M Co	25	15c	Nov 24	Dec 29	Jan 18	A K Durbrow, 309 Montgomery
Overman S M Co	76	10c	Nov 28	Dec 31	Jan 22	Geo D Edwards, 414 California
Silver King M Co	15	25c	Oct 26	Dec 7	Jan 5	J W Pew, 310 Pine
Thorpe M Co, Cal	4	5c	Oct 14	Dec 22	Jan 9	A F Frey, 567 Market
Ybarra G M Co, Lower Cal	6	10c	Dec 4	Jan 6	Jan 25	Jas Coffin, 132 Market
Reward G M Co, Cal	17	3c	Dec 19	Jan 20	Feb 5	S W Backus, Mills Building

ANNUAL MEETINGS.

Company and Location.	Secretary and Office in S. F.	Date.
Brunswick Con G M Co, Cal	J Stadtfeld, 309 Montgomery	Jan 14
Bullion M Co, Nev	R R Grayson, 331 Pine	Jan 14
Silver King M Co, Nev	J W Pew, 310 Pine	Jan 12

Mining Share Market.

SAN FRANCISCO, Dec. 31, 1896.

The mining share market the past year was a disappointment to the many, who had been led to believe there would be high prices on a genuine ore development in one or more of the mines on the Comstock lode. Judging from the work done it does not appear to be the fault of the superintendents, but rather the absence of ore bodies giving high assays in gold. It now looks as if work will have to be extended further to the west so as to see if the rich gold-bearing ore found near the surface years ago extends down to any considerable depth. That this can now be done is admitted by the better informed miners, who claim that the ground on the supposed west lode has been drained toward the northern end by the long west crossdrift run by the West Consolidated Virginia on out through Con Virginia ground; by the long Gould & Curry west drift toward the middle, that run by Bullion further south, while that which is being run jointly by Challenge, Confidence and Con Imperial will drain it well toward the Gold Hill group. Years ago Yellow Jacket drove a west crossdrift out a long distance, and reports were current at the time work was stopped that a body of high-grade gold ore had been struck. With what is supposed to be the west lode drained for a distance of several thousand feet and to a depth of over 1500 feet, it can be run far on upper levels, and if it is struck and found rich in gold then it can be developed at many points which would give a new lease of life to the Comstock mines. To do this it will take time and a large expenditure of money, and the latter means assessment, but the end would justify the means.

The low prices that ruled for the Comstock shares, with no life whatever to the market the fore part of the year, caused one of the most active brokers to join in with other operators to bring the Brunswick lode to the front. With this object in view they secured the cooperation of the mining companies on the Comstock whose ground is between Bullion and Ophir. These companies bought ground on that lode corresponding in size to that held by them on the Comstock. After the titles had passed and work began at one or two points the shares of Occidental began to exhibit life and under active trading made quite an advance from the low figure. Singular enough the shares of the other mines did not move up much in sympathy but sagged off. After sending Chollar down to 35 cents a share it began to show more activity and taking the lead made quite an advance, moving up to $3.10 a share, and then broke rapidly, fully 50 per cent, from this figure it recovered and moved up to $4.30 a share. In its movements Potosi sympathized more than any of the others owing to the work in Chollar being towards it. The upmove was manipulated on reports of ore development which was verified by mining superintendents and some brokers. The latter might possibly tell galena ore from gold ore but not mica from gold, yet their opinions were published and brought in outside buyers and also caused nearly all the short sellers to fill at a heavy loss. After this the market began to decline and, with the exception of occasional rallies, has not stopped since, although within the past fortnight slightly better prices have ruled. Occidental, which sold for dollars at one time this year, is below 10 cents now, while Chollar, after selling at $4.30, went below 80 cents with a strong probability that before six months it will sell, assessments paid, below 50 cents, unless a genuine ore development is made. It looks at this writing as if the shares of the leading mines on the Comstock are sufficiently concentrated to admit of a small deal next spring, which may be done even if they do not find ore. Yet ore may be run into almost any day for the possibilities of the Comstock lode are not entirely exhausted and active exploiting work is being done in nearly every mine on the lode.

While the Comstock mining shares were active and selling at higher prices, the Bodie shares were more or less neglected, pending a consolidation under one name (Con. Standard) of Bodie, Mono, Bulwer and Standard. It took several months to bring it out, but it is so far advanced that it can be said to be practically accomplished. Lately the Bodie and Bulwer shares have shown strength and sold at higher figures. There can be no doubt that, under the consolidation, work can be carried on to a much better advantage, and, with improved methods of mining and milling, dividends will be paid. But, when speculative mines pay dividends, they become investment propositions, and, as such, the market value of the shares do not make rapid fluctuations, and, when this is the case, they are not attractive to those who buy and sell for a gamble.

The inactivity of the market, with slow, dragging prices, does not cause disappointment. It has been many years since any show of activity was manifested during the mid-winter holidays, and even then there was no pending meeting of the California Legislature. The writer has never seen an active, higher and fluctuating market while the Legislature was in session, and if there is during the coming session it is more than experienced dealers look for. The cause for a slow market and depressed prices at that time is probably owing to the fear of manipulators and mine managers inviting adverse legislation. So far as official letters from the mines go there is nothing of an encouraging character, for about all they contained is skeletoned, as if the meat had been taken off and the bones thrown to the public. Private advices from seemingly well-informed sources are of rather an encouraging character, but they point to time before favorable results can be expected to follow the work which is being done. It may take from one to two lines of assessments to pay expenses while prosecuting the work to given points in several of the mines, but it is reasonable in the interim to look for spurts in the market so as to induce holders to pay assessments.

In the Bodie group of shares dealing has been confined almost entirely to Bodie and Bulwer. It is the opinion that next spring there will be more activity in these shares, for the outlook in that district is quite en-

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couraging for dividends. Soon after a consolidation of Standard, Bodie, Mono and Bulwer is an accomplished fact, with but one stock on the market, more activity is looked for in it than in all of them at the present time.

Notwithstanding that the history of the share market has been such as to warrant asserting there will be no active and higher prices while the California Legislature is in session, yet there are persons claiming to have sources for securing the best of information who are firm in the conviction that before January passes the market will range considerably higher than it ruled to-day. This, they believe, will be done purely on manipulations and bull points, with little or no merit to back it up.

From the Brunswick lode there is nothing of particular interest to note. In Occidental they are sinking on an ore streak from the 550-foot level. On the 750-foot level they are running a southeast drift. In Chollar they are about ready to start two crossdrifts on the 400-foot level south of those they have been running. They are in hope that these drifts will show more ore, and of higher grade, than did the other two. We are not advised as to the work on the 500-foot Hale & Norcross shaft level. In the latter mine no work is being done. In Savage they continue work on the level reported last week. In Best & Belcher and Gould & Curry work is continued on the 300-foot, and also tunnel level. So far the work in these two mines has not come up to expectations, provided official letters have not been misleading.

From the Comstock mines the official letters continue to report more or less active work in the different mines except Crown Point, Kentuck, Exchequer, Chollar and Potosi. Although no work has been done, so far as official letters are concerned, in Kentuck and Exchequer for a long time yet they do not neglect to work shareholders for money by levying assessments. It creates the impression that there must be a large line of shares out and by stopping work but not stopping assessing they can be bought at low prices before a good sized deal. That the latter will come is as certain as the Comstock lode exists, but not until the powers that be have all the shares they want, for it is not human for moneyed men to make money for others unless they get the lion's share. The letters filed this week indicate that in Alta they are preparing to lose sight of the streaks of ore which it was thought would lead up to a big development of gold bearing ore. In Overman they manage to raise a few tons of ore each week while prosecuting exploiting work on a small scale. Seg. Belcher and Belcher continue to raise a few tons of ore but the letters are still silent from what level the ore is extracted. Nothing is reported from Crown Point and Yellow Jacket.

In Confidence they continue to raise a few tons of ore while doing exploiting work. No work is being done by Challenge. In Consolidated Imperial the long joint west crossdrift of Confidence, Challenge and Consolidated Imperial is being pushed ahead at a snail's pace. Slow work is also being done in the other west crossdrift. In Alpha they are still doing procrastinating work, as if to see how long it will take them not to do what it is expected they should do. The work is on the 550-foot level to the west.

In Bullion they are still pushing toward Potosi. In the latter mine, and also Chollar, work was stopped just as it began to look as if enough ore would be found to more than pay expenses.

In Hale & Norcross work is confined to the 900-foot level. Mining men are quite hopeful that quite a body of ore will be developed before many weeks pass. In Savage the work is mostly of a kill-time character. Nothing is expected to come from it. Gould & Curry and Best & Belcher are still pushing ahead, but slowly, the joint east crossdrift from the 800-foot Bonner shaft.

The work in Consolidated Virginia is not attracting much attention. It is thought that another assessment will have to be levied and collected before the work will be far enough advanced to show to much advantage in the way of ore development. The work is still continued on the 1000-foot, 1650-foot and 1750-foot levels. No ore was raised last week.

In Ophir the work is to the west, both on the tunnel and 1000-foot levels. In the official letter nothing new is reported.

In Mexican work is still continued on the 1000-foot level. In Union, Sierra Nevada, Utah and Andes the work reported is on the same levels and direction given in last week's review. Private advices, it is said, report that very important work in the west is being done in one of the mines, but official letters are silent on the subject.

From the Bodie district nothing new is at hand, and none looked for until towards next spring.

The following illustrates the changes of the week:

MINES.	Dec. 23.	Dec. 30.
Alpha	.....	.....
Alta Consolidated	$ 03	.....
Andes	14	.....
Belcher	46	$ 48
Best & Belcher	47	55
Bodie	55	62
Bullion	09	.....
Challenge	34	35
Chollar	88	81
Confidence	87	85
Consolidated California and Virginia	1 10	1 10
Consolidated New York	.....	.....
Crown Point	23	21
Exchequer	.....	.....
Gould & Curry	26	.....
Hale & Norcross	1 15	1 10
Justice	.....	.....
Mexican	42	41
Ophir	92	94
Overman	.....	17
Potosi	.....	54
Savage	31	26
Sierra Nevada	43	.....
Union	38	40
Utah	.....	.....
Yellow Jacket	34	31

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING DECEMBER 22, 1896.

573,805.—PADLOCK—G. L. Baker, Waterford, Cal.
573,651.—WRENCH—L. J. Hall, Bourne, Or.
573,593.—ENGINE AND HARVESTER—B. Holt, Stockton, Cal.
573,605.—ODORLESS CREMATORY—C. W. Lent, Oakland, Cal.
573,824.—PLOW—E. J. Lotze, Northport, Wash.
573,828.—VELOCIPEDE—S. E. Maxon, Portland, Or.
573,722.—PROPELLER—J. H. McDonald, Olympia, Wash.
573,521.—PRINTING FRAME—Moore & McLaughlin, Los Angeles, Cal.
573,611.—EJECTOR—Wm. Muir, Michigan Bluff, Cal.
573,832.—DREDGER—C. H. Olsen, Tacoma, Wash.
573,698.—EXCAVATOR—Phillips & Stebinger, Portland, Or.
573,702.—WRENCH—Richard & Colman, Bisbee, A. T.
573,540.—AIRSHIP—E. J. St. Croix, Seattle, Wash.
573,550.—GLOVE BUTTON—J. Steinberger, S. F.
573,725.—GUN SIGHT—C. G. Thunen, Oroville, Cal.
573,562.—PROPELLER—F. Wittram, S. F.
26,423.—DESIGN FOR VIOLIN—E. N. Livermore, Port Townsend, Wash.
26,424.—DESIGN FOR MANDOLIN—E. N. Livermore, Port Townsend, Wash.
26,427.—DESIGN FOR CARD MOUNT—P. J. Scuparich, S. F.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

METALLIC FURRING FOR BUILDINGS.—John T. McCormick, San Francisco, Cal. No. 573,158. Dated Dec. 15, 1896. This invention relates to an improvement in what is technically called a furring or support for lathing and plastering, which form the interior walls and ceilings of buildings. It consits of rectangular bars crossing each other, those extending in one direction having slots perforated in them to receive those extending in the other direction, the latter being twisted and interlocked at the point of junction, and both sets of bars standing with the edges in the same direction. Curved clamps or hangers have one end adapted to engage the girder flanges, and the other ends bent to engage and interlock with the bars.

CONSTRUCTION AND PROPULSION OF VEHICLES.—John Gambetta, Stockton, Cal. No. 573,214. Dated Dec. 15, 1896. This invention relates to improvements in vehicles, and means for propelling them. It consists of a wheel shaft having pinions mounted thereon with clutch mechanisms whereby rotation in a forward direction will engage them with the shaft, and rotation in the opposite direction will disengage them therefrom. Toothed rack bars engage the pinions, and have mechanism by which they are reciprocated, so as to apply power to rotate the wheel shaft, while supplemental vertically movable rack bars engage pinions upon the wheel shaft, and have wheels journaled in their lower ends to form contact with the ground when passing over irregularities in the surface, so that the supplemental racks are moved and power applied through them. In conjunction with these devices is a brake bar having a pair of rollers, one above and one below each end and arms connecting the brake bar with the knee levers through which, by a foot piece, the brake may be applied.

Information Wanted.

TO THE EDITOR:—Can you, or any of your readers, give me any information concerning the Earl Gold Reef Mining Co. and the King of the Rockies mine, or Mining Co., i. e., where their properties are situated, whether either of them have ever paid a dividend, whether it is likely that they will ever pay dividends, under what management is either company operating, or are they in operation at all, at this present time? E. D. G.

Globe, Arizona, Dec. 24th, '96.

San Francisco Stock Board Sales.

SAN FRANCISCO, December 30, 1896.

9:30 A. M. SESSION.

50 Belcher	48	100 Mono	20
150 Best & Belcher	55	100 Ophir	94
100 Bodie	62	300 Overman	17
50 Challenge	35	100 Savage	26
310 Con Cal & Va.	1 10	200 Seg Belcher	10
100 Crown Point	21	100 Union	40

SECOND SESSION—2:30 P. M.

100 Ophir	94	100 H. & N.	1 10
100 Mexican	41	150 Yellow Jacket	31
200 Best & Belcher	50	100 Belcher	48
100 Con Cal & Va.	1 10	100 Confidence	85
100 Savage	24	200 Overman	16
100 Chollar	81	100 Challenge	33
100 Potosi	54	300 Syndicate	03

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Assessment Notices.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9) of five cents (5c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

CON. CALIFORNIA AND VIRGINIA MINING Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of December, 1896, an assessment (No. 7), of 25 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, Room No. 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 4th day of February, 1897, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room No. 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

HALE & NORCROSS SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 8th day of December, 1896, an assessment (No. 110) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 3, No. 331 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on MONDAY, the 11th day of January, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 1st day of February, 1897, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

R. U. COLLINS, Secretary.

Office—Room 3, Stock Exchange building, No. 331 Pine street, San Francisco, California.

GOULD & CURRY SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 14th day of December, 1896, an assessment (No. 80) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 69, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of January, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on TUESDAY, the 9th day of February, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Trustees.

ALFRED K. DURBROW, Secretary.

Office—Room 69, Nevada Block, 309 Montgomery St., San Francisco, California.

HARTMANN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Chili Gulch Mining District, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 22nd day of December, 1896, an assessment (No. 1) of 5 cents per share was levied upon the issued capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 46, No. 4 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of February, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 23d day of February, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

G. W. PEER, Secretary.

Office—Room 46, No. 4 Montgomery street, San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from C. C. Beever, in the Union mine, near Brownsville, Yuba county, to deposit tailings in a ravine below the mine; from C. P. Saxton, in the Saxton mine, near Geneses, Plumas county, to deposit tailings in Little Grizzley creek; from O. D. Campbell, in the Sailor Flat mine, near Blue Tent, Nevada county, to deposit tailings in Sailor Flat canyon; from W. H. De Mott, in the Blue Tent mine, near Blue Tent, Nevada county, to deposit tailings in an old pit; from Mathias Diehl, in the Frank Milan claim, near Camptonville, Yuba county, to deposit tailings in Mill creek; from R. M. Cunningham and Thomas Phillips, in the Montre placer mine, near Pike City, Sierra county, to deposit tailings in a ravine below the mine; from Cy. Mulkey, in the Cedar Creek Consolidated mines, near Fair Play, El Dorado county, to deposit tailings in Cedar creek; and from Al. Petty, in the Lucot mine, near Volcano, Amador county, to deposit tailings in a ravine below the mine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on January 4th, 1897, at 1:30 P. M.

EDWARD L. HALLAWELL,

115 and 117 Main Street (2nd floor),

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Reports on mines, designs and superintends the erection of mining and milling machinery; makes analyses of ores, metals, soils, etc.; arranges for mill tests, and selects suitable processes for the treatment of ores. Correspondence invited. Address W. J. R. COWELL, Victoria, B. C.

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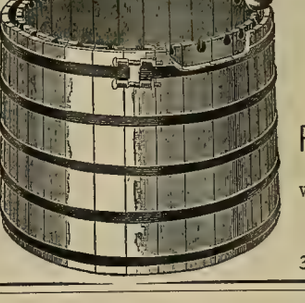
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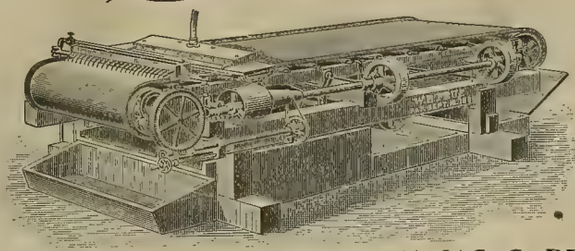
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It can be safely stated, without going into a description of several new and untried concentrators that have lately come into the market, that where sulphurets are of such value as to make close saving necessary, the Frue Vanner is always used. It is the only endless belt concentrator in the market that can be relied on to handle all classes of ores, and give universal satisfaction. (In all competition of concentrators the Frue Vanner is taken as the standard machine of the world and all comparisons made by it. There have been over 4200 of these machines sold, 1700 having been sold on the Pacific coast alone.) They are in use in every part of the world where mining is carried on and in all cases they are giving perfect satisfaction. From time to time valuable and important improvements have been made in this machine to increase its capacity and durability, and particular attention is called to the Patent Lip Flange for the rubber belt, which does away with nearly all the strain and cracking, as in the old style of flange, making the life of belt more than double that of other style belts in the market. The lip of flange bends outward in going over the large end rolls, thereby distributing the strain in the solid rubber, and bringing virtually no strain either at the edge or at the base of flange, as is the case in all belts with a raised edge.

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Office and Works: Cor. Beale and Howard Streets, San Francisco, Cal.

READ WHAT MINERS THINK OF THE BRYAN PATENT ROLLER QUARTZ MILL AND JOHNSTON CONCENTRATOR.

OFFICE OF THE CANDELARIA CONSOLIDATED MEXICAN MINING CO.,
SAN DIMAS, DURANGO, MEXICO, October 25, 1888.

RISDON IRON WORKS, San Francisco—Gentlemen: Our company has been operating three of the 4-foot Bryan Roller Quartz Mills, one of which has been running steadily for three years, one for two and one for one year. Our quartz is very hard; we crush through a No. 60 mesh screen. Our mills run 55 revolutions per minute, and each crush through 60-mesh screens 12 tons in 24 hours; through 50-mesh, 15 tons; and through 40 mesh, 18 tons. This proportion has been continuous.

One set of dies will crush from 1500 to 1600 tons.
One set of tires will crush 1500 tons.
One ring plate will crush from 2200 to 2300 tons.

The mills require very little attention. At our mill an ordinary "peon," earning one dollar per day has complete charge.

In regard to sliming, in comparison with stamps, by reason of the discharge surface and the continuous agitation by the scrapers, a MUCH less amount of slime is created. A three years' experience teaches me that, in every respect, the mills are a complete success, and of material benefit to the mining world. They can be set up and running in forty-eight hours and can be dismounted in the same time and removed to wherever desired. Ours were packed on our mule trail over as difficult a road as any in Mexico. As a gold amalgamator it is unequaled by any mill now in existence. Yours truly,

D. M. BURNS, Superintendent.

BULLION-BECK AND CHAMPION MINING COMPANY,
EUREKA, UTAH, August 24, 1895.

THE RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: Referring to contract made by you with the Bullion-Beck and Champion Mining Company, by which you were to furnish one 5-foot Bryan Roller Quartz Mill on four months' trial, in competition with the Huntington Mill, would say that we have made the test, and the Bryan Mill has proven so greatly superior on all points claimed, viz., capacity and economy, that we have ordered a second Bryan Mill from you and have concluded to discontinue the use of the Huntington Mill.

Yours truly, JOHN BECK, Pres.
SIMON BAMBERGER, Director. [Copy.] W. J. BEATIE, Sec't'y.

BULLION-BECK AND CHAMPION MINING COMPANY,
EUREKA, UTAH, Aug. 24, 1895.

THE RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: In February last, in connection with the five-foot Bryan Roller Mill which we took from you to test in competition with the Huntington Mill, we also took a six-foot Johnston Concentrator to be tested with ten Frues, one end shake with four belts and one side shake Woodbury. We have been working these machines since the mill was completed, at such times when we had sufficient water.

The terms on which the test was made was that the machine doing the most satisfactory work should be accepted and the others taken out. This did not apply to the Frue, as they were purchased with the plant. In compliance with this agreement, we now inform you that the Johnston Concentrator has proved so superior over the other machines that we now order from you four more of the Johnston Concentrators. Yours truly, JOHN BECK, Pres.
SIMON BAMBERGER, Director. W. J. BEATIE, Sec't'y.

GREAT SALT LAKE AND HOT SPRINGS RAILWAY,
S. BAMBERGER, President and Manager,
SALT LAKE CITY, UTAH, October 10, 1895.

B. R. TAWNDRAW, ESQ., care Guyer Hot Springs, Ketchum, Idaho—Dear Sir: In reply to yours of the twenty-eighth of September, we have been using at the Bullion-Beck Concentrating Works, Frue Vanner, Woodbury and Johnston machines, side by side for the last four months; and after a thorough trial of all of them, we concluded that the Johnston Vanner was doing the most accurate work and was the best; hence, we bought four more Johnston machines and shall continue to use them in preference to any other.

You will find it the easiest regulated machine and very much easier set up than either of the other machines. We bought our machines from the Risdon Iron Works, of San Francisco, where Mr. Johnston, the patentee, personally superintends the manufacturing of them.

Hoping you will make a success, I remain, Yours truly,
[Copy.] [Signed] SIMON BAMBERGER.

THE GOLD VALLEY MINING COMPANY OF SAN FRANCISCO,
C. C. MCIVER, President; D. CUSHMAN, Secretary.
MISSION SAN JOSE, CAL., Oct. 17th, 1895.

RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: We take great pleasure in having to inform you that, after a careful investigation extending over a six weeks' steady run alongside of six other concentrators, the Johnston which you put in for us was the only machine from which you could not find a loss in the tailings. It has done all you claim for it and has proved more than satisfactory. We intend replacing all our other concentrators with Johnston's, as we are convinced they will pay for themselves many times over in a year. CHAS. C. MCIVER, President.

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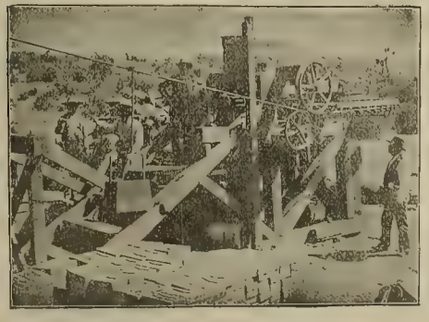
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MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 1905.—VOLUME LXXIV. Number 2. SAN FRANCISCO, SATURDAY, JANUARY 9, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Gold Yield of 1896.

Telegrams from Washington announce that the Director of the Mint estimates the production of gold in the United States in 1896 to have been about $51,500,000. Yet the tables of output from the different States and Territories given out by the Mint officers would indicate an output of about $54,000,000. The gold yield of 1895 was placed by the United States Geological Survey at $46,610,000.

Statistics are nearly always more or less unreliable, and when the final figures come from the Director of the Mint they can only be considered as generally approximate. Incompetence and carelessness on the part of those who gather data for the Government or the State is partly the reason why statistics are not more accurate, and yet probably the main cause is the impossibility of gathering all the facts and figures. An example of carelessness is shown in the table of the returns of gold and silver produced in the counties of California in 1894 and 1895 in the State Mineralogist's report lately issued. Neither he nor the able statistician of the Mint can probably be blamed, however, as the faults are due, no doubt, to the Mint employes and those who make up data for other sources of information. The point referred to in their tables is that no returns are made of silver from such counties as Siskiyou, Sierra and Plumas for 1894. Yet those who send bullion to the Mint from those counties receive in the returns a small percentage of silver on every shipment. The amount is not large, but it should certainly be considered. Then there is evidence in the figures themselves that in other counties all the silver received from them has not been credited to the output figures of that metal. Take Placer, for example. The returns of silver for 1894 was $664.37 and of gold $1,851,214.52, and, for 1895, silver $5,272.53 and gold $1,599,634.79. It is hardly possible that the proportion of silver increased so much in the gold bars sent to the Mint, but that the returns were not properly kept and tabulated.

The information given out by the Director of the Mint at Washington would indicate that the yield of Colorado has fallen off over $1,000,000. As to California the figure given is about what has been estimated by the most conservative here—$16,500,000—and is probably only a guess, as little data has come in.

Nevada and Arizona are credited with doubling their outputs, and, excepting Colorado, there has been an increase in each State and Territory. The lowest estimate of the Director of the Mint would show an increase in the yield of gold of about $5,000,000.

As to silver, the Director's returns would indicate a decrease in the output of about 2,500,000 ounces. Utah makes the largest gain, while there is a heavy falling off in Montana and Colorado.

It is stated in the Virginia City papers that a number of capitalists are investigating a proposition to drain the American Flat country by extending a branch of the Sutro tunnel from the main line at the Crown Point mine or the Alta. The length would be about 8000 feet. It is claimed that this would open up some thirty or forty mines on American Flat from which the miners were driven away by large floods below the 500 and 600 levels many years ago.

Sawmill Run by Electricity.

On this page and on page 32 of this issue is illustrated the only sawmill in the world run wholly by transmitted electricity. It is at Folsom, Cal., the property of the American River Land and Lumber Co., and the power is furnished by the Sacramento Electric, Gas & Railway Co., which supplies Sacramento with electric light and power, by the famous transmission plan recently illustrated and described in these columns. The mill is a band mill of 50,000 feet capacity, ten hours run. The sugar pine is cut in the Sierras, railroaded to a chute down which the logs drop half a mile in twenty seconds, into a deep still-water basin formed by a dam on the south fork of the American river, forty-two miles from Folsom, whence they are driven to the booms just above the Folsom dam and thence by canal 1½ miles to the mill, the canal also supplying the water to drive the electric generators. The electric power comes from a switch panel in the main power house of the Sacramento Electric, Gas & Railway Co., 600 feet from the mill, through three No. 1 B. & S. gauge wires. The induction motors at the sawmill are on the first floor; a 75 H. P. motor runs the large band saw, one of 50 H. P. runs the edger, smaller ones supply power to the log roll, sawdust and slab conveyors, log carriage, trimmer, live rolls, etc., which are on the floor above.



FOLSOM ELECTRIC SAWMILL—THE FIRST SAWMILL RUN WHOLLY BY ELECTRICITY.

In the filing room a small motor runs the machinery there. Transformers supply the voltage and the 150 lights. The electrical plant was put in by the General Electric Co., the sawmill machinery was supplied by the E. P. Allis Co.

Of the American River Land and Lumber Co., A. J. Ralston is president, H. P. Livermore manager, Joshua Barker secretary, Chas. E. Livermore, Albert Gallatin, John and James Treadwell associates. The fact that it is the first sawmill in the world to be wholly run by electrical power warrants its illustration.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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J. F. HALLORAN.....General Manager

San Francisco, January 9, 1897.

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Deep Mining in California.

The fact that the Kennedy mine, in Amador county, has reached a depth of 2200 feet, where the ore is as rich and the ore body as large as in any of the upper workings, is of importance to miners along that gold belt. The ledge is 30 feet in width at that point and it has been determined by the company to sink 200 feet additional. The greatest depth heretofore attained in any California gold mine was 2182 feet, in the Idaho mine at Grass Valley. With the exception of mines in Victoria, Australia, the Kennedy is probably the deepest purely gold mine in the world, unless since the last monthly report the Robinson Deep, in the Rand, in South Africa, has made considerable headway in sinking.

The great improvements made in hoisting machinery and the reductions in the cost of raising ore within a few years past has given a great impulse to sinking deep shafts. The main obstacles to deep mining are the decrease in the amount of ore that can be lifted per day, the increase in the pressure and temperature at great depths, and the increase in expenditure. The first obstacle is becoming less with improvements in machinery and methods of hoisting, and the last obstacle is being partially overcome by reductions in expenditure per ton in mining, handling and milling ores. At present these obstacles will not prevent sinking much deeper than the Kennedy has gone, provided ore can be found.

Is Foreign Capital Needed for American Gold Mines?

Enough is known of the gold yield of 1896 to make certain that the greatest increase of output has been in the United States. Africa and Australia barely hold their own, while the yield in this country will exceed that of 1895 by probably at least $10,000,000. Yet in none of the other leading gold producing countries of the world has so little capital from Europe been invested.

English capitalists finding less opportunities for investment in Africa and Australia, have turned rather to British Columbia and South America than to this country.

The fact that in these hard times, and in an election year, when money was tied up more than usual, the gold mines of the United States were so energetically developed and worked, mostly by local capital, as to increase the yield by over 20 per cent, while all other leading industries were depressed, must give food for thought. A much greater amount of new capital was put into the mines of Australia and South Africa than in those of the United States, yet they barely hold their own in yield.

A great deal is said in papers published in mining districts about the value of inducing foreign capitalists to come in. But is this wise? The very fact that, in such a bad year for interesting money in anything as 1896, local capital has done so much, would indicate that outside help is not so very necessary.

If our mines are developed by our own people it will mean that the profits will remain here. That outside capital is needed for British Columbia, for South Africa and for Australia is evident; but is that true of this country? The Russian Government and others jealously guard this source of wealth from foreigners. The local capitalist who invests money in developing mines surely is doing much more good than one who induces foreign capital to come in and drain from our greatest source of wealth.

The University and the Mining School.

The University of California will ask from the State Legislature, now in session, for direct appropriations of certain sums of money or for an increase in the annual tax levy, for an enlargement of the regular income of the institution. This is a matter that, under present circumstances, should particularly interest the mining industry and the members of the Legislature from the mining counties of the State.

The Federal Government has made large appropriations of public lands, particularly for the establishment of agricultural colleges. California has received from the sale of these lands more than any other State in the Union. As a result—with private gifts and appropriations made by the Legislature—the greatest State institution of learning in America has been built up in Berkeley. Because so much was at first appropriated directly for the agricultural college, more has been expended in that direction than in any other, and to-day California has the best agriculture school in the world, with one of the most distinguished men in agricultural chemistry at its head. Naturally it would be expected that California would do more for a mining school than for any other practical branch in the University, yet less has been expended upon the mining school at Berkeley than upon any other of the scientific colleges, although there are more students in the mining school than in any other scientific college in the institution. However, this is the fault of the miners themselves. They have not asked the State for special appropriations for the mining school.

Now Mr. Reinstein, who was lately appointed a Regent, believing that some return was expected of him for what he considers an honor, has secured promises of bequests that aggregate over four millions of dollars from different individuals. A large proportion of this money—nearly all of it, in fact—will be given for specific purposes. This means that the State or the University must go to some further expense to make available the gifts offered.

Mr. Reinstein appreciates the fact that if the agricultural, the mining college and other colleges of science are first built up, the true foundation of a great university will have been laid. Most of those who have offered their contributions are of the same mind, and of the large sums to go to the University enough will be specially devoted to the building up of the School of Mines to make it the best in the world, provided something is done by the State. Any gift for a specific purpose naturally entails an extra expense on the University; but, as it is small in proportion, should be ungrudgingly given by the State. So far the State has built up a University that has cost about $10,000,000. Yet of all this over four-fifths has been given by the Federal Government and by private individuals. No other public institution is of more value or greater credit to the State. Of the students who have been educated at Berkeley, over a third could not have gone there had there been charges for tuition such as those at Yale or Harvard.

THE United States Geological Survey's report, covering the mineral resources of the country, shows that in nearly every branch of the iron and steel industries last year's production was the largest on record. Pig iron enlarged 2,788,920 tons, and iron and steel rolled into finished forms 1,547,363 tons. The distribution of the varied industries shows a wide area. Rolling mills are found in 30 States, and blast furnaces in 24.

The Proposed Mining Laws.

There has been a good deal said about the trouble that would ensue from claim jumping in all the Western States and Territories on the first of January of this year, owing to failure to do the required assessment work. In point of fact, there has been very little trouble—less than there was a year ago—simply because the locators have been exceedingly careful to place themselves in strong positions of defense by doing the necessary work in advance. In many cases mine owners have gone to the expense of employing lawyers to tell them what should be done in order to retain title. Again, in many cases claim owners have expended more than was really necessary, simply because they did not know what the law required and could not find out through their attorneys or any other sources of information what was necessary to be done in order to perfect title.

Altogether, this is a hardship entailed upon the mining industry—particularly those who enter it with honest intent—caused by the State and Territorial Legislatures in failing to provide proper laws or statutes supplementing the statutes of the federal government.

The MINING AND SCIENTIFIC PRESS in November last proposed some bills for the consideration of the State Legislature of California to remedy this evil. Those bills were endorsed by the recent convention of the California State Miners' Association and have been recommended for passage by the Governor of California. Their publication has attracted the attention of papers published in mining districts of all the other States and Territories in which mining is conducted. In some of them part of these proposed laws are now in force but others are not. The fact that the passage of those not already in force in other States and Territories is advocated is the best evidence that can be offered of their value. As published in the MINING AND SCIENTIFIC PRESS and offered for the consideration of the Legislature, they were presented with the expectation that changes would be made—particularly as to minor details. Little claim for originality can be made, for the reason that nearly every article in all the proposed laws is now upon the statute books of some State or Territory and has been found to give good results.

One objection will always be made to these, or any other laws proposed as to locating mines and perfecting titles, and that is that too much is required of the locator. He would be compelled to put up a certain number of stakes and do a certain amount of work, such as sinking a shaft or running a tunnel, immediately upon locating his claim. The only people who can make reasonable objection to this are the old prospector, who is too lazy to do the required work, and the man who wants to take up a large number of claims at as little expense as possible and wait for some one to come and buy him out.

The proposed laws would give a needed protection to the earnest and honest miner against these classes and would do much to discourage claim jumping and prevent uncertainties in mining titles.

Upon this subject the Governor in his message to the Legislature last Monday wrote as follows:

It is well known to all miners and mining lawyers that the laws relating to the location, relocation, and manner of recording lode and placer claims, the work necessary to hold possession thereof, and the right of co-owners, are very unsettled; that their rights to liens thereon are uncertain and most unsatisfactory. The United States Government recognizes miners' laws and customs where there are no statutory provisions governing the same.

The miners' convention, at its recent session, appointed a committee to propose new laws, or revise the existing ones, on these and kindred subjects, and they will cause bills to be prepared for your consideration. Considering the high source from which these measures come, I recommend their most careful consideration, and when so drawn or amended as to remove the uncertainty existing and to give relief to prospectors and miners, and stability and record to their claims and proper liens thereon, that they be passed.

Concentrates.

THE Mercur, Utah, mine paid $225,000 dividends in '96.

THERE are coal mines opened in every county in Wyoming except one.

IN Wyoming during 1896 there were 378 gold mining locations made.

THERE were produced in the United States, in 1896, 77,000 tons of zinc.

THE November South African gold exports aggregated in value $3,437,645.

THE Copper Queen Mining Company of Bisbee, Arizona, employs nearly 800 men.

THE mineral entries in Utah in 1896 show a considerable increase over previous years.

THERE were shipped from the Nova Scotia mines in 1896 about 140,000 tons of gypsum.

THE Oregon Legislature will establish a School of Mines in the eastern part of that State.

THE output of gold in Tuolumne county for 1896 is estimated by the *Union-Democrat* as nearly $2,000,000.

THE new Spokane Stock Exchange has been incorporated and is expected to begin business in a few days.

THE Spokane *Spokesman-Review* estimates the yield of the Cœur d'Alene, Idaho, mines for 1896 at $5,000,000.

A TELEGRAM from Santa Barbara announces that a gold discovery has been made in Smith's canyon, six miles from that city.

IT is the intention of the owners of the Mercur mine in Utah to increase the daily capacity of the mill from 200 to 300 tons.

THE silly season in mining is not quite over. A ledge 800 feet wide has been discovered in Idaho that will assay from $3 to $7.

THE yield of gold in Australia and New Zealand for 1896 is estimated at a slight increase over that of 1895, which was $42,793,824.

THE 10-stamp mill at the Richenbar camp, sixty miles north of Phœnix, is the only quartz mill in Arizona that is run by electricity.

THE yield of gold in the Rand, South Africa, in 1896 was 1,860,771 fine ounces, against 1,858,650 for 1895, a gain of 2,121 ounces.

THE output of quicksilver in the United States in 1896, all from California, was 33,012 flasks, a decrease from that of 1895 of 966 flasks.

BULLION handled by the Denver branch mint in 1896 was: Gold, $4,218,861; silver, $27,373; total, $4,246,234. Last year's total was $4,280,286.

THE reports and estimates would indicate that the world's yield of gold for 1896 was about $220,000,000, against about $201,000,000 for 1895.

OIL has been discovered near St. David in Cochise county, Arizona, but it has not been demonstrated whether it is in paying quantities or not.

THE bulk of the nickel of the world came from Canada last year. Matte and ores amounting to 3,697,000 pounds were imported into this country.

THE Vulture mine in Arizona has been placed on the London market at the rate of $1,000,000, through a company formed with that amount of capital.

A NUGGET weighing sixty-four ounces was picked up last week in southern Oregon, but part of it was quartz and its value in gold was about $500.

THE gold output of South Dakota for 1896 is estimated by the State Mine Inspector at $6,178,675, against $4,910,000 for 1895, an increase of $1,268,675.

ADDING the dividends paid and the returns of net profits of close corporations and private properties, the earnings of the mines of Utah for 1896 were $2,161,771.

TO DATE there have been 239 applications to the U. S. Debris Commission for permits to work hydraulic mines in this State, of which 161 have been granted.

SEVERAL veins of coal have been discovered in Rogue river valley in Oregon and the work done, it is claimed, shows that they may become of considerable value.

IMPORTS of specie from Mexico in 1896 were $7,830,254 in dollars, $1,163,684 in silver bullion and $824,644 in gold bullion. Total, $9,818,582, against $9,350,460 in 1895.

AT the United States Assay Office at Boise, Idaho, the mineral output of Idaho for 1896 is placed at: Gold, $4,275,665; silver, $5,777,848; lead, $3,090,117; total, $13,143,630.

A DISCOVERY has been made of corundum in Hastings county, Ontario, Canada, which the Geological Survey believes may be made of immediate economical value.

THE owners of the Leon mine, south of Perris, Cal., contemplate erecting a 10-stamp mill on the property. They have considerable ore on the dumps, including some telluride.

IT is estimated by the mint authorities that the gold yield of Nevada for 1896 was $2,955,000, against $1,552,200 for 1895, and of silver 772,000 ounces, against 956,200 ounces for 1895.

ACCORDING to the last estimate of the Director of the Mint in Washington the product of Alaska in gold in 1896 was $3,249,000 as against $1,615,300 in 1895 and in silver 77,300 ounces.

A THREE-QUARTERS interest in the Caledonia mine of Cripple Creek has been sold in London for $576,000 and several other properties controlled by the same people are under negotiation.

THE work of development in Ragged Top, the new district in the Black Hills, South Dakota, is being pushed forward in many mines and there have already been laid out three townsites.

THE ore shipments from British Columbia entering the State of Washington through the Northport custom house from June, 1895, to the end of November, 1896, was valued at $2,182,607.95.

THE Mineral Land Commission in Montana has reported that they have classified about 700,000 acres of land. Of this, in 1895, 20 per cent was declared mineral and in 1896, 4½ per cent.

SPOKANE, Washington, was in earlier days the center of many trails and wagon roads from parts of Idaho and Washington and can now be reached by five lines of transcontinental railroads.

OTTOMAR HAUPT figures that the net output of gold of the world last year, after deducting the amounts used in the arts, was probably $140,000,000. For the six years ending December 31, 1895, he reckons the net output, after making the same deduction, at $600,000,000. At the beginning of June, 1896, the visible stock of gold had reached the sum of no less than $2,300,000,000.

THE receipts of treasure at San Francisco through Wells, Fargo & Co.'s express for 1896 amounted to $29,362,874, of which $18,293,191 was in coin, $639,754 in silver bullion and $10,429,929 in gold bullion.

A NEW furnace at the New Idria quicksilver mine in San Benito county was destroyed by fire last week. The loss is estimated at $75,000 and a large number of miners were thrown out of employment.

A SYNDICATE composed of Standard Oil Company people some time ago obtained options on properties in the Deep Creek district, Utah, and after having done some development work are about to take them up.

ACCORDING to the Bingham, Utah, *Bulletin*, the output of the camp for 1896 was 54,016 tons of ore. Of this amount, the Dalton & Lark shipped 16,913 tons, the Old Telegraph 12,000 tons and the Old Jordan and Galena 8135.

THE Union Smelting and Refining Company has been incorporated under the laws of Washington for the purpose of erecting a smelter at Northport, near the British Columbia line, to work ores especially from the province.

AN effort will be made by Utah and other lead producers to have the duty on lead ores increased by Congress at the next session. The fall in the price of lead has affected Utah more than any other State or Territory during the past year.

THE combined capital of all the chartered gold and silver mining companies in Canada is over $200,000,000. By provinces the figures stand: British Columbia, $256,325,075; Ontario, $32,094,900; New Brunswick, $1,030,000; Manitoba, $50,000.

THE Tomboy, at Telluride, Colorado, cost June, 1894, $105,000. Up to Jan. 1, 1897, it paid $1,000,000 in dividends. If the sale to the Exploration Company for $2,000,000 is completed, the profits on an investment of $105,000 will be nearly $3,000,000.

THE manager of one of the largest Utah smelters says that he belives that in a very short time prices will advance, and that the advance would be to a figure which will justify the producers of silver-lead ores in again going forward with their energetic extraction.

THE output of San Miguel county, Colorado, for 1896 is placed by the Telluride *Journal*, on returns from the mint and the smelters, at $2,299,037 in gold and $705,040 in silver and lead—a total of $3,004,077. During the year 2039 carloads of ore were shipped from Telluride.

AN inter-provincial conference of Canadian mine owners and mining engineers will be held in Montreal on February 3, 4 and 5. Subjects for special discussion will be "The Total Abolition of Duty on Mining Machinery," and "The Removal of the Duty on Explosives."

ELECTRICITY has supplanted the mule as a motive power in handling the slag pots of the United Verde copper mines in Arizona. The prospector's old friend and companion is gradually being driven out of different means of earning an honest livelihood by steam and electricity.

UTAH owns over 7,300,000 acres of land granted by the Federal government, of which 5,760,000 acres are school lands, 126,000 University land, 200,000 Agricultural College land, 100,000 College of Mines land, 50,000 for a Miner's hospital and 500,000 for establishing reservoirs for irrigation purposes.

AMONG the early fairy tales of '97 is the Seattle project to build "a smelter at Gray's Harbor, Wash., to utilize the black sand so extensively found on the sea beach." When that is done the projectors can also build a solar engine, the power to be procured from sunbeams extracted from cucumbers.

THERE is a novel hydraulic mining plant on the Rogue river near Grant's Pass, Oregon. Two large pumps have been put in—one a centrifugal and the other a duplex Gardner. The latter provides water from the river for sluicing and the former for piping—forcing the water through a nozzle against the bank.

H. E. HUNTINGTON and a number of engineers of the Southern Pacific Company have been in Randsburg, Kern county, looking over the ground, with a view to building a branch from Mojave. People connected with the Atlantic and Pacific have also been looking over the county with the idea of building from Kramer.

THE Department of Geology of the University of California has issued a bulletin on "Two Tertiary Faunæ from the Rocks of the Southern Coast of Vancouver Island," by Dr. J. C. Merriam. The good work done at the institution is inducing geologists from far beyond the limits of California to send to it for determinations.

IN the San Carlos reservation, Arizona, since the segregation of part of the land, considerable prospecting has been done and several mining camps have been started. The ore is mostly copper carrying gold. In one district where large bodies of galena ore have been discovered there are evidences of work having been done centuries ago.

A RECEIVER has been appointed for the Siskiyou Mining Company in Oregon near the California line. It is a Maryland corporation and this action was taken to prevent attachment being laid by creditors before the copper ore on the dumps could be marketed. It is claimed that about $30,000 have been spent on the mines, and that there is on the dump $15,000 in copper ore and matte.

ESTIMATES of the output of mineral in Utah in 1896 made by Wells, Fargo & Co. are as follows: 3,561,860 pounds of copper, 73,430,060 pounds of unrefined lead, 8,728,705 ounces fine silver and 93,896 ounces fine gold. Computing the gold and silver at their mint valuation and other metals at their value at the seaboard, makes a total valuation of the product of $15,897,266, showing an increase of $1,377,377 over last year.

THERE has been greater increases in the yield of gold and copper in the United States than of other minerals. The output of copper exceeded that of 1895 by about 70,000,000 pounds and of gold probably nearly $10,000,000. The production of lead shows an increase of from 5 to 7 per cent, while the estimates of the Director of the Mint shows a falling off in the yield of silver of about 2,600,000 ounces.

AT the Moreno dam, in San Diego county, last week the Southern California Mountain Water Company fired a blast with giant and black powder that moved 150,000 tons of rock. This is said by the Los Angeles *Times* to be the largest blast in the history of the State. In 1878 a blast was fired in the Dardanelles mine in Placer county that moved 500,000 cubic yards of gravel. Nineteen tons of Judson powder were used, or what would be equal to about 75,000 pounds of black powder.

BETWEEN 1890 and 1895 the world's production of gold was increased 75 per cent. The gold production of the United States in 1895 was of the value of $46,610,000, and the silver production had a commercial value of $36,445,000. The increase in gold for the year was $7,110,000 and in silver $5,023,000. Officers of the mint service estimate for 1896 the product of gold $51,500,000, an increase of $5,000,000 over 1895; 52,000,000 to 53,000,000 fine ounces of silver, a decrease of 2,500,000 to 3,000,000 ounces.

AT a meeting of the mine owners in the new Ragged Top district, in the Black Hills, South Dakota, an organization has been formed mainly for the purpose of protecting themselves against professional claim jumpers and blackmailers. One of the articles of organization provides that whenever the mining ground of any member is jumped, he may appeal to the Executive Committee or any member close at hand for assistance and they shall immediately accompany the owner and eject the jumpers.

FAST time has been made in driving the new shaft in the Utica mine at Angels Camp. It is a three compartment shaft and the foreman, Gabe Price, announces that 140 feet were made in thirty days in December. There were three shifts of four men each, employing three machine drills. The rock, which is a hard gray slate, had to be blasted from one foot below the surface, and is considered as hard as any in the mines. It takes on an average twenty-four holes to put it down six feet, and dulls about eighty drills in that distance.

THE United States post office authorities are doing good work in the East in making an investigation of the methods of certain mining brokers in New York and other Eastern cities, who advertise in local newspapers and receive money to invest in certain stocks. It is claimed that the inspectors find that they keep a set of books for mail orders and that these are carefully doctored each day so that the victim is certain to lose. Many complaints of fraud have been made and the Government will take steps to suppress them.

THERE was more activity on the part of locators in doing the required assessment work before the end of last year than ever before. In a much smaller proportion of cases than usual did they trust to evading the law by making new locations. The professional jumper was in evidence but found poorer pickings than he did last year in all those States and Territories in which the State laws have not properly supplemented the Federal Statutes. After all the claim jumper is doing good missionary work in showing the necessity for good State and Territorial laws.

THE estimate of the output of Cripple Creek for 1896, made by Colorado papers, is about $10,000,000. The output for 1895 was about $8,000,000. Of this year's yield the Portland is credited with nearly one-sixth, or $1,600,000, and Stratton's Independence with $900,000. However, as the most conservative of Colorado papers admit that there will be a falling off in the total yield of the State from that of last year, the estimate in Cripple Creek is probably high. The output of silver, gold, lead and copper for the State is estimated variously from $34,000,000 to $39,000,000.

ESTIMATES of the mineral output of Arizona for 1896, the figures being mainly based on reports sent the Governor from different sections, are as follows: Gold, $6,000,000; silver, 2,100,000 ounces; copper, 102,000,000 pounds; lead, 2,400,000 pounds. The gold has come mainly from pyritic ores, a large amount being also production in conjunction with sulphuretic copper. Over half of the silver came from the county of Mojave, in the northern part of the Territory, from small properties. The copper came from the Jerome mine in Yavapai county, Old Dominion at Globe, Detroit Company at Clifton, Copper Queen mines at Clifton.

SOME New York, Chicago and Kansas City capitalists have lost a lot of money on worthless mining ground alleged to contain zinc and lead in Western Kansas. The assays presented by the promoters showed high grades of ore and options were taken on 100,000 acres of lands. The Eastern speculators are said to have spent $200,000 in the purchase, and a few weeks ago smelter machinery was bought. Excitement ran high, and the Kansas City speculators sent Prof. Howorth of the State University to the alleged mines to make an assay. He has returned and reports that only a trace of the mineral can be detected. The promoters have deserted the field.

ASSAYER-IN-CHARGE BRADEN of the United States Assay Office at Helena gives out the following figures as his estimate of the mineral output of Montana for 1896: Gold, $4,500,000; silver, 16,000,000 ounces; copper, 230,000,000 pounds; lead, 22,000,000 pounds. Compared with that of 1896, these figures show an increased output of about $200,000 in gold, a decrease of 1,000,000 ounces of silver, a decrease of between 2,000,000 and 3,000,000 pounds of lead, and an increase of 30,000,000 pounds of copper. This would make the total value of these minerals produced from the mines of the State, at the present prices of the metals, amount to the sum of $41,960,000.

THE Mountain Copper Co., Ltd., which has purchased the property of the Mountain Mining Co., Shasta Co., Cal., and of the New Jersey Metal Refining Works, Elizabeth, N. J., is an English corporation with a capital of £1,250,000. The stated purchase price is $6,750,000—$3,666,850 cash, $2,083,150 in paid-up shares. The latest expert report states that 84% of the samples taken average 8¾% of copper, and that there are 1,338,184 tons of ore in sight. It is figured that the present cost of the production of copper—£34 3s 4d per ton—can be reduced by £8 12s per ton when the company has its own plant, and that at the present cost of production there is a profit of £18 16s 3d on each ton of copper produced.

THE thirteenth report of the State Mineralogist has been published. A short account is given of the progress of work in mines of different classes in the State, including gold, silver, asphalt, borax, chrome iron, coal, magnesite, petroleum, quicksilver, asbestos, salt and others, and natural springs and the sources of structural materials. A large field has been covered and considering the small amount appropriated for the work a great deal of valuable information has been gathered. Besides this a number of special articles by well known authorities on subjects of interest to miners are included in the volume. Copies may be obtained by any citizen of this State by applying to the State Mineralogist, San Francisco, or forwarding 17 cents in stamps with his address. The price of the work to those living outside of California is $1.

Responsibility for the Debris.

Written for the MINING AND SCIENTIFIC PRESS.

There has been of late a revival of the question of the deposits of debris in the Sacramento river and its tributaries that has led to a discussion as to whether some other means than the building of restraining dams might not be of value to keep the streams clear. Now that much hydraulic mining has been prohibited since 1880, it appears to be timely to discuss the various phases of the matter, and particularly to show that the contention of the hydraulic miners that they were responsible only in small part for the evils complained of was in accordance with the facts, to the end that the duty of the State and of the Federal Government to act in the matter may be shown.

This and some papers to follow have been prepared for the MINING AND SCIENTIFIC PRESS by a competent engineer. The data is taken from acknowledged authorities and the estimates will be admitted to be conservative.

The first question is as to the amount of debris now resting in the Sacramento drainage system as shown by data published by various engineering corps and commissions on the subject.

The total amount of this material can be shown to be four times the amount that has been washed from the mines themselves. The question as to where the remaining three-fourths comes from naturally arises.

The following table shows the debris estimated to be lodged on the Sacramento drainage system with the authorities for the estimates:

Stream.	*Cubic Yards.*	*Authority.*
Yuba River, below De Guerre Point	308,000,000	Annual Report Chief Engineers, 1895.
Yuba River, between Smartsville and De Guerre Point	100,000,000	Annual Report Chief Engineers, 1895.
Yuba River—South. Middle and Main Forks	26,000,000	Annual Report Chief Engineers, 1891.
Sacramento and Feather Rivers, below Marysville	120,000,000	Annual Report Chief Engineers, 1895.
Feather River, above Marysville	34,000,000	Annual Report Chief Engineers, 1891.
Suisun Bay	477,000,000	Annual Report Chief Engineers, 1895.
San Pablo Bay	76,000,000	Ex. Doc. 98, 47th Congress, first session.
American River	45,000,000	Ex. Doc 98, 47th Congress, first session.
Bear River	122,000,000	Keys vs. Little York Cold W. & W. Co et al.
Cosumnes River	6,000,000	Ex. Doc. 98, 47th Congress, first session.
Total	1,314,000,000	

These estimates take no cognizance of the material lying immediately upon the mine dumps and in the lateral canyons and gullies, which is usually estimated to be one-third of the amount removed from the mines, or about 215,000,000 cubic yards, as will be shown later. This makes a total of about 1,529,000,000 cubic yards of debris in all.

The question now arises how much of this enormous amount of debris is due to the hydraulic miners. Two estimates have been made of the annual washings along the Sacramento drainage based upon the water used, at a certain duty per inch. They are as follows:

	Season 1878–79. Cubic yards.	*Season 1879–80. Cubic yards.*
Table Mountain Creek	3,556,000	2,919,375
Butte Creek		84,000
Yuba River	22,336,500	19,103,598
Feather River	12,687,500	4,407,770
Bear River	5,555,000	3,351,246
Dry Creek No. 2	680,000	132,687
American River	8,604,000	8,615,250
Totals	*53,404,000	†38,613,926

It has been claimed by many that these estimates are too high; but if we take the average of the two, we have 46,000,000 cubic yards as the annual washing during the latter part of the hydraulic mining period. A bit of corroborative evidence of the correctness of this estimate lies in the following. The result of washing over 110,000,000 cubic yards of gravel, given by A. J. Bowie‡, shows an average yield of nearly 11 cents per yard. The annual yield, therefore, from the hydraulic mines should be nearly $5,160,000. It will be shown elsewhere from other sources that the annual yield from hydraulic mines was not far from $5,300,000.

The total amount of gravel washed from the mines may be approximated. Hydraulic mining scarcely began until 1860, and gradually increased until 1881. Supposing that for the eleven years from 1870 to 1881 the annual washing to be 46,000,000 cubic yards, and from 1860 to 1870 one-half this amount, we have a total of 650,000,000 cubic yards washed from the hydraulic mines. This is surely a very liberal estimate, but this amount is but 42% of the debris calculated to be now resting below the mines.

In the well known suit against the North Bloomfield, the excavations of the mines were measured and the amount excavated determined to be 176,000,000 cubic yards. Yet the U. S. Engineers determined that in the Yuba alone there lies 434,000,000 cubic yards of debris. That is, the excavated gravel is but 40% of the debris. And in this debris is not considered the amounts in the Sacramento river down to the bay of San Francisco, nor that on the mine dumps.

The question as to what proportion of debris turned into the rivers passes into the sea or finds lodgment elsewhere than in the drainage channels, is open to much discussion. But, supposing that but 50% of the material turned into the main channels passes away as slickens—and it is usually estimated at 66%—then there has been 3,050,000,000 cubic yards of material placed in the rivers, of which but 21% can be laid at the door of the hydraulic miner. Some doubt may be entertained as to the approximate correctness of the estimates given, but they have been based upon surveys and data collected by impartial Government engineers, and must be accepted as the best obtainable.

The question therefore arises: Where does the remaining four-fifths of this debris come from?

The importance of natural erosion has long been underestimated in mining debris discussions. It may be asked why this erosion did not take place before mining began. To some extent it did, and the river had filled its channel a great deal through geological ages long before the hydraulic miner came on the scene. But the rate of this erosion has been enormously increased by the advent of civilization upon the slopes of the Sierra. The soil has been loosened by cultivation, by the building of roads and ditches and the removal of vegetation. The early placer miner ascended gradually from the main streams to their branches, and finally up the side gullies, loosening and stirring up the gravel and soil and sending it to the lower channels.

A field near Forest Hill, Placer county, cleared of brush and planted produced a splendid crop the first year, but in the fourth year there was not enough soil remaining to raise a crop. This, of course, was on a steep sidehill. Everyone who has traversed the wagon roads of the Sierras show a remarkable amount of erosion. For long stretches on the North Bloomfield and Forest Hill Divides the roads are often natural cuts from 2 to 5 feet deep, often of several such cuts, parallel. A rough estimate shows over 7000 miles of roads in the area under discussion. Supposing these to have been excavated less than 1 foot deep—a moderate estimate, for the roads are often a series of parallel cuts—over 10,000,000 cubic yards of material has been removed. The Tenth and Eleventh Census Reports show that 4050 miles of mining and irrigation ditches have been built in the region and aside from the loosened dirt from their excavation great cuts, larger than many hydraulic pits may often be seen below some waste-gate or break. But all of these are minor affairs in comparison with the amount of augmented erosion caused by the loosening of the soil by cultivation and removal of the vegetation, and the instances are only given to emphasize the more important fact of which no certain data can be given. The material transported by natural forces is the fine sands and silts which reach the valleys and are much more effective in building up channel-bottoms and destroying farm lands than the larger proportion of coarse sands and gravel from the mines which seldom reach the plains.

The river Po with a drainage basin of 30,000 square miles discharges annually over 56,000,000 cubic yards of sediment and this river has so built up its channels as to make the surface of the water in places higher than the surrounding country from which it is restrained by dikes. This river has no hydraulic mining in its drainage. The Sacramento has a drainage area of less than 27,000 square miles, but comparisons must not be made as to these two streams, for their hydrograhic conditions are entirely different and the Po is only mentioned to show the enormous work of natural erosion. It is probable that the Sacramento could be shown to be doing even more work than the Po.

The geological history of the region has a bearing upon the debris question. The geology of the Sacramento, as often described by eminent geologists, is, in brief, as follows: The valleys of the Sacramento and San Joaquin were at one time a great inland sea. This sea received along its shores the sediments carried down by the streams from the Coast Range on the west and the Sierras on the east. In very recent geological time this basin was elevated so as to leave a great plain, sloping gently from each side toward the center. In this depression two great rivers were formed by the union of the formerly independent streams. These streams were torrential on account of their greater slope, and able to carry particles in mechanical suspension which the small grade and sluggish movements of the Sacramento of the present day cannot. These sediments were therefore deposited along the Sacramento—and the San Joaquin for that matter—and gradually the great depression was filled up. In times of high water the Sacramento spread over a wide flood plain and through this dead water flowed the swifter current of the main river; the current was able in itself to carry sediments that would deposit in the dead water. Along the contact between the still water and the current the moving water was checked and a line of sediment deposited, and thus a natural levee was built. This levee grew through many centuries until we have the Sacramento of to-day—a river between two belts of valuable farm lands, back of which on either side are swamps. Such phenomena are present along every river which flows through a flood plain.

The Sacramento has therefore built up its own channel long before the advent of men, and will continue to do so until some great change in topography shall change it altogether or until it reaches an exact base level—that is, until it is built up high enough to give it sufficient grade to carry off its sediments, as does the river Po. All of this is a slow process, but cultivation has greatly hastened it and the hydraulic miner has contributed his share, in a small proportion, as has been shown.

It may be said in passing that mining is responsible for this cultivation; it is also responsible for California's settlement, her transportation facilities, her towns, the value of her agricultural lands and her greatness.

Nearly as much debris is coming down the river to-day as during the days of hydraulic mining, for the natural erosion has been annually increased by increase in cultivation. The river has continued to devastate the farm lands since the closing of the mines in nearly as great a proportion as before, and will continue to do so.

In conclusion it may be said, then, that the Sacramento has been raising her channel and increasing the swamps for centuries, and will continue to do so. This devastation of the valley has been hastened by settlement and cultivation, and to a small proportion tion by the hydraulic miner.

*State Engineer Rept., 1880. Vol. III, p. 24. These amounts are based upon returns of the amounts of water used made by miners upon blanks sent out.

†Mendall, Report upon Mining Debris in California Rivers, 1882, p. 15. Based upon county assessors' returns of amount of water used.

‡Hydraulic Mining, p. 280.

Prince Hilkoff on Siberian Mines.

Prince Hilkoff, the Russian Minister of Ways and Communications, who lately passed through this country, gave some data to a representative of the New York *Herald* as to the Siberian Railway, and, speaking of the mineral resources, said:

"Recent investigations have shown how enormous are the riches in the bowels of this country and what little use has been made of them up to the present time. Iron and coal, the two great factors of industrial development, are found over nearly all Siberia and in very rich veins. The proper working of these riches will give a powerful advancement to the development of progress in Siberia. Mineral fuel also, which is of such great importance in working a railway line, has been discovered in such quantities in the formations that have been investigated that the Trans-Siberian Railway will be supplied for many years to come. In addition to this fact, however, wood is in many places so cheap that it can successfully compete with coal, especially in those parts of the route which are intersected by navigable rivers, along which the wood may be floated. The Siberian Railway will no doubt have a great influence upon gold mining. This industry heretofore has only prospered where very auriferous formations were worked. Many of them have been neglected only because the price of labor and machinery did not admit of their being worked with sufficient profit. In America, I believe, and in other countries where gold mining is carried on, much poorer beds are worked, and therefore the output is larger than in Siberia. The Siberian Railway will facilitate and cheapen the carriage of stores and implements to the gold mines, and also increase the supply of labor, from an insufficiency of which many of the mines are now suffering."

South Carolina's Mica.

The largest source of mica in the world is in South Carolina. Mica is found there in all sorts of blocks, of various thicknesses and shapes, which can be split and resplit almost without limit, until it becomes the transparent pane of commerce.

The material is scattered through the feldspar with which the surrounding mountains are mostly covered. The veins are found between walls of slate. It is blasted from the surrounding rock by means of dynamite, and is freed from all impure matter by miners with chisel and pick. From the mines it is taken directly to the shops, where it is split into thin sheets and trimmed into regular forms, which are then ready for the market, the price varying according to the size of the sheets.

The average size will fit an ordinary parlor heater. In rare instances sheets as large as 24x18 inches are found, but there is seldom or never a demand for mica of this size, so the sheets have to be cut down.

THE report of Leneve Foster, the mineralogist, brings England face to face with the fact of possible coal exhaustion. He says its supply will not stand a yearly increase of 3½ per cent in the output, and that signs of decline probably will become apparent within a lifetime. Prof. Jeven's estimate was that a century at the present rate of progress the output would exhaust English mines to a depth of 4000 feet, which is 1500 feet deeper than the present deepest mine.

The Solution and Precipitation of the Cyanide of Gold.*

NUMBER IV.

By S. B. CHRISTY, Professor of Mining and Metallurgy, University of California, Berkeley, Cal.

5. *On the Precipitation of Potassium Aurocyanides by Copper and its Compounds.*

It was early noted in the study of the cyanide process that copper, with its compounds, was destined to play a very important role in its development. In fact, it is well known that certain copper minerals are active obstacles to the successful extraction of gold from its ores.

The thought naturally suggested itself: May not this difficulty in the solution of gold be utilized to aid in its precipitation? In March, 1893, a sheet of metallic copper was immersed in a solution of cyanide of potassium containing a gramme of gold in solution. Instead of the precipitation of metallic gold on the copper, a light yellow precipitate began to form throughout the liquid. Very little of this formed on the copper itself; it was found as a sediment throughout the liquid. After three days three-fourths of the gold had been precipitated. The copper was then removed; but the gold-containing sediment continued to separate from the solution for over a week, until all but 11 mg. of the gold had been precipitated. This very important experiment did not at the time seem to lead to anything practicable, for the action seemed too slow and uncertain to be of any value.

Recalling the fact that the sulphide of copper had been suggested by C. H. Aaron and L. D. Godshall (*Eng. and Min. Jour.*, Nov. 29, 1890), for the precipitation of gold from the chloride solution produced in the Plattner chlorination process, it occurred to me that a similar precipitation might take place from the cyanide solution. Hence, on May 4, 1893, three lots of potassium aurocyanide, with 0.02 per cent of KCy and a quarter of a gramme of gold, were treated by agitation for four hours with CuS precipitated from $CuSO_4$ by H_2S. The still moist precipitate was washed and then stirred into the solution. One of the solutions was left neutral, the other made strongly alkaline with caustic potash, and the third made acid with sulphuric acid. In the alkaline and neutral solutions two-thirds of the gold were thrown down by the copper sulphide; in the acid one, all of it was precipitated. Numerous experiments with the sulphide of copper produced by fusion showed that the form originally used gave the best results, probably on account of its greater surface. Since the date of its first discovery, in May, 1893, this method of recovery of gold from cyanide solutions has been repeatedly used in my laboratory, and has stood the most rigid tests. It is necessary to acidify the solution with a mineral acid like sulphuric acid, and it is best to remove as far as possible the free HCy by one of the methods already explained. In case there is less than 0.1 per cent of free HCy present, this may be omitted. The CuS, Aq produced by the action of H_2S on a solution of $CuSO_4$ is then added to the solution; the whole is stirred thoroughly at intervals for several hours and then filtered out. The gold will be contained in the residue.

In one case, CuS, weighing, when dried, 5 grammes, was added to 1000 c.c. of an acidified solution of aurocyanhydric acid containing one gramme of gold in solution. All the gold was precipitated. The copper sulphide precipitated one-fifth of its dry weight of gold. The gold was readily recovered from the residue, after making it alkaline by digesting it with sodium sulphide, in which the gold is readily soluble. The copper sulphide may then be used over again. From the sulphide solution the gold is readily precipitated by electrolysis, the more readily as the solution is small in bulk and concentrated. Other methods of extracting the gold from the copper are also available.

The gold may also be removed from the cyanide solution, after acidification, by filtering it through CuS without agitation. I prefer, however, to agitate first and filter afterwards. Another method that was used was to add copper sulphate and then sulphydric acid to the acidified solution. Provided the excess of free HCy be first removed, one atom of copper will thus precipitate one atom of gold, or one pound of metallic copper as sulphate will precipitate 3.11 pounds of gold.

Both of these methods were used with complete success on the solutions obtained by treating gold ores with cyanide solution at various intervals from May, 1893, to 1896.

A careful study of the solutions used in the above experiments showed that the gold was precipitated without more than a trace of copper going into the solution. The unusual occurrence of one metal precipitating another without itself going into the solution, led to a careful study of the reaction involved. This was also viewed in the light of the experiment with the strip of metallic copper already mentioned. Also, in an experiment made in 1894, where Cu_2S was used to precipitate the gold from an acid solution of aurocyanide, a white precipitate, containing cuprous cyanide, was formed, which gave to the entire solution the appearance of milk. It was also noticed that when copper sulphate was added to a strong solution of of aurocyanide, a white precipitate formed which contained gold and copper. Also, when H_2S was added to a gold cyanide solution containing copper, it was noticed that, at the first instant when the gas came in contact with the solution, a white precipitate was formed, which gradually changed to the black color of copper sulphide as more H_2S was added. All these considerations pointed to the conclusion that the gold-containing precipitate was in all cases mainly a salt of aurocyanhydric acid, either cuprous aurocyanide or the corresponding sulphosalt.

This explanation of the reaction was made early in 1894. As soon as this was settled, another method suggested itself, and proved to be a success. A solution of cuprous chloride was prepared by adding sodium chloride to a solution of cupric sulphate and saturating the mixture with sulphurous acid. When this was added to the potassium aurocyanide, a white precipitate was formed at once, which contained all the gold. In the first experiment tried the metallic copper, present as cuprous chloride, precipitated over twice its weight of gold. All the cuprous salts were found effective for this purpose. Even the cuprous cyanide formed by adding copper sulphate to a potassium cyanide solution, and then acidifying with sulphuric acid and filtering out the white, curdy cuprous cyanide, was thus effective. As this salt is much more permanent than the cuprous chloride, it may prove of service in practice, though it is more expensive than the latter. I have also found that cuprous hyposulphite precipitates aurocyanides. The precipitate, however, is soluble in excess of either potassium cyanide or sodium hyposulphite. Hence a complete precipitation of the gold can only be expected after the solution has been made acid.

The method that I have used most constantly since April, 1895, is to add sulphuric acid to gold cyanide solution till it reacts acid to litmus. If the solution is strong in HCy, it is usually best to remove this first, either by the aeration method already described, or else to remove it, previous to the acidification, by means of the zinc sulphate method, to be mentioned later. To the acidified solution I add cuprous chloride, as above described. When this solution is added, the gold and excess of HCy come down at once as a white precipitate, generally turning slightly yellow. The cuprous chloride should be added till a drop of the filtrate gives a red precipitate with ferrocyanide of potassium. The gold is thus rendered insoluble, and may be filtered out as cuprous aurocyanide ($CuAuCy_2$). This compound is insoluble in dilute acids, but readily soluble in cyanide of potassium. The gold is easily extracted from it in several ways.

In October, 1895, Prof. P. de Wilde, of the University of Brussels, published a method of precipitating gold from cyanide solutions in the *Revue Universelle des Mines, de la Metallurgie, etc.*, in an article entitled "Note on a New Method for the Extraction of Gold from Tailings, Slimes and Concentrates."

His method consists in three steps:

a. The leaching of the ore, etc. This he does, as in the Siemens and Halske process, with an 0.05 per cent KCy solution, containing about the same amount of free caustic soda or lime, as may be necessary.

b. The recovery of the excess of alkaline cyanide. This he attempts, as had already been proposed by MacArthur, by adding ferrous sulphate and precipitating ferrous cyanide until potassium ferricyanide gives with a drop of the filtrate a precipitate of Prussian blue. In order to avoid the precipitation of the gold it is necessary that the free alkali should be nearly neutralized before adding the ferrous sulphate. This method will work, as I have proved by experiment, but I regard it as thoroughly unpractical. The bulk of the precipitate is something enormous; it takes a week to filter and remove the gold solution; the precipitate is constantly changing composition, running finally into Prussian blue; and it is no simple matter to extract the cyanide from it when once it has been obtained. The author himself evidently does not put much faith in it. He concludes by remarking that with dilute cyanide solutions this step of recovery may be omitted.

c. The precipitation of the gold. Here he describes a method the same in principle, and almost the same in detail, as the one I have described as used in my laboratory since April, 1895. I translate from his article:

"My third operation is based on the following principle: In a solution containing the double cyanide of gold and potassium ($AuKCy_2$) (or sodium) one precipitates all the cyanogen in the form of aurous cyanide (AuCy) and cuprous cyanide (CuCy), on acidifying first the solution with sulphurous acid (SO_3H_2) and then adding a solution of sulphate of copper (CuSO*).

"The reaction is extremely sharp, and the least excess of sulphate of copper suffices to produce an absolutely complete precipitation of the gold. In operating under the most varied conditions and with solutions containing only five or six milligrammes of gold to the 1000 c.c., I have never been able to find the least loss of gold.

"If the liquid contains alkaline cyanide in excess (which is the case in my method), this is transformed completely into cuprous cyanide.

"The acidification can be made by the injection of sulphurous anhydride (SO_2) by means of a solution of sulphurous acid, or of an alkaline bi-sulphite (metasulphite of potassium or of sodium $Na_2S_2O_5$)."

(*To be Continued.*)

*Colorado meeting American Institute of Mining Engineers, Sept., 1896. (Revised Proofs Dec. '96.)

Nevada City District Geology.

NUMBER V.

In the Banner Hill district the veins are, as a rule, comparatively narrow. The ore is often rich and heavily charged with sulphurets, among which iron pyrites, arsenical pyrites, and zinc-blende are the most prominent. The sulphurets contain a considerable amount of silver. Along Deer creek, especially in the eastern part, there is a strong system of sheeting developed, cutting both the granodiorite and the sedimentary rock. The sheets or benches usually show a dip of 30° to 50° toward the north, and strike east and west. In the fissures dividing the sheets a narrow line showing iron pyrites and a bleaching of the country rock may be noted. Most of the quartz veins are parallel to this fissure system. The Omega, Neversweat, Belle Fountain, Lecompton, Montana, Willow Valley and Franklin are the most prominent of these mines. They are narrow veins, and have not been worked on a very extensive scale. The ore frequently runs above $100 per ton. The bullion contains much silver, and also, it is said, antimony. The developments on the Cyane, Constitution, and Levant are slight. The Federal Loan, which has been worked during the last few years down to the 600-foot level, dips south and is parallel to another and less developed system of sheeting. The ore from the Federal Loan is of a character similar to that of the mines mentioned. The vein varies from a few inches to several feet in thickness, and rich stringers are frequently abundant in the adjoining rock. There are about 6 per cent of sulphurets. The vein system at the Texas mine is parallel to that of the Willow Valley mines, but little work has been done to develop the property. The ore is said to contain 4 per cent of sulphurets and to yield $10 per ton. The Texas shaft was sunk to a depth of 160 feet ten years ago. The Deadwood is a flat vein dipping west. Its true direction is nearly north-south, though the topography gives its outcrop a nearly east-west direction. About $300,000 have been produced from this vein on which no work has been done for the last ten years. In ore and character it is similar to the other Willow Valley mines. The deposits of the Murchie mine consist of two veins with flat westerly dip, the Independence and the Lone Star, and the two east-west veins, the Big Blue and the Alice Belle; the principal work has been done on the first three. The veins are 2 to 3 feet thick; the ore contains 4 to 5 per cent of sulphurets and runs about $15 to the ton. The pay-shoots on the Big Blue are said to have followed the lines of intersection with the first two. The property was worked between 1878 and 1883, producing about $600,000.

Parallel to the Big Blue are the Caledonia and Kingsbury veins, the latter of which has been but slightly developed. The Caledonia has been opened to the level of Little Deer creek. It is said to be a wide ledge with low-grade, heavily sulphureted ore. The large St. Louis vein also belongs to this group, which shows the somewhat unusual east-northeast direction and steep northerly dip. It is an exceptionally straight and strong vein, which can be traced from the point where it emerges from under the andesite as far as McCormick's place, just over the map line in the Nevada City district. It is very wide in places, but the quartz is of low grade and has not been worked extensively at any place. The Charonnat or Canada Hill vein is faulted considerably by it. The Glencoe-Alaska, south of the St. Louis, is the continuation of the strong and well-defined Orleans vein in the Nevada City district. It runs about west 15° north, with steep southerly dip. It has been worked to a depth of 100 feet at the western end of the Glencoe claim, where the ledge is said to be 4 feet thick and heavily sulphureted. The ore is not of high grade. Between the strong vein of St. Louis and Glencoe lies a network of veins running in different directions. The most important is the Canada Hill-Mayflower group. An exceedingly well-defined sheeting of the granodiorite is noted near Canada Hill. There are several veins parallel to this sheeting and dipping west at slight angles. The Charonnat vein has been worked to a depth of 1300 feet on the incline. Between 1879 and 1887 it produced about $350,000, from ore worth $15 per ton and containing 2½ per cent sulphurets, with a value of $100 per ton. The Grant vein is parallel with the Charonnat, but dips to the east. Of the many veins in the Mayflower ground the Beckman is the most important. Its strike is east and west, and the dip is very flat southward. It is about a foot thick and the ore is very heavily sulphureted, containing, as do most veins in the vicinity, large quantities of arsenical pyrites and zinc-blende. A similar small flat vein, which has been worked at several places, is found to the west of this, on Sharp's and McCormick's ground. About North Banner an important group of veins occurs, which have in

general a northerly direction and an easterly dip of from 35° to 60°. Formerly the most important was the Banner vein, worked principally from 1865 to 1875, to a depth of 620 feet. It yielded several hundred thousand dollars. The ore was heavily sulphureted and averaged $20 per ton. The vein lies in hard, black slate, and evidently shows the same tendency as the Federal Loan to splinter up in stringers. The Banner vein does not continue north of the creek, or at least cannot be traced with certainty. On the North Banner ground there are four nearly parallel veins. These have recently been worked to some extent, producing from $30,000 to $50,000 for several successive years; the ore is not heavily sulphureted and contains a considerable amount of silver. To the west of the North Banner is the Union mine, on which the developments are slight. At 200 feet below the surface the vein cuts across the slate contact without change in direction or dip.

The quartz veins of the Nevada City district are as follows: The Orleans vein continues from the Banner Hill district across Gold Flat. In direction and dip this strong, continuous vein is parallel to the Idaho of Grass Valley. The developments are small, however, being chiefly confined to the old Orleans shaft, 200 feet deep, and the shaft at Fortuna mine. At the Gracie claim the vein is 1 to 2 feet thick. To the north of this vein there are many smaller veins, and still more to the south of it. The Sneath & Clay, in granodiorite, has a westerly, flat dip and is a comparatively narrow vein, but a pay shoot proved very rich in former years. It has been idle for the last few years. The Pittsburg, in diabase, has a north-northeast direction and an easterly dip. The vein averages 15 inches thick, and the quartz, whenever present, is of high grade. The sulphurets are not abundant, consisting chiefly of iron pyrites and galena. The Pittsburg has, at intervals, been an important producer. The shaft is 800 feet deep on the incline. The Gold Flat-Potosi vein lies a short dsitance westward. In character it is similar to the Pittsburg, and has been worked to a depth of 200 feet. Both veins are repeatedly faulted by several east-and-west fissures. Considerable work has been done in former years on the Thomas and Mohigan veins. The shaft on the former is 800 feet deep; the ore was heavily sulphureted and rich, but the ore bodies were very irregular.

The veins of the Providence-Gold Tunnel system are of the greatest interest and economic importance. They have in general a direction ranging from north-northwest to north-northeast and on the whole a very uniform easterly dip of from 35° to 45°. A peculiar radiating arrangement is clearly noticeable, all of the veins converging toward a point a short distance west of the Fortuna mine, but apparently dying out before reaching it. The easterly veins are in granodiorite, and begin with the Nevada county and Midnight (Stiles) veins, on both of which comparatively little work has been done. Westward lies the long Gold Tunnel vein, which has been worked at several places. At the Reward mine the vein is about 1 foot wide and has been worked to a depth of 200 feet. On the California ground the shaft is 600 feet deep on the incline, and in former years much good ore has been extracted. Northward the Gold Tunnel claim follows, with an inclined shaft 600 feet deep. The Gold Tunnel was a heavy producer for many years, but has been idle of late. It is known to have produced several hundred thousand dollars. At the northerly end of the vein is the Pennsylvania mine, with a shaft 500 feet deep. The vein is from 1½ to 2 feet wide, and the ore extracted averages $15 to $20, with 8 per cent of sulphurets.

The westerly veins of the Providence system begin with the Mountaineer, which for many years has been a heavy producer. The shaft is 850 feet on the incline. The average thickness of the vein is 1 foot, and the ore is often heavily sulphureted. The granodiorite adjoining the vein is usually very hard.

The Merrifield is probably the heaviest and longest vein in the district. It is first noted 3000 feet south of the Providence mine. Farther southward is the small vein of General Grant and El Capitan, which may possibly indicate a still more southerly extension of the Merrifield. At the Providence mine the vein leaves the slate and enters the granodiorite; it continues strong up to above the Spanish mine, with a slightly more westerly direction; above the Spanish mine the vein splits up somewhat, but there can hardly be any doubt that Mount Auburn represents its continuation northward. It is probably the same Merrifield vein that emerges from under the lava in the northwestern corner of the map area and continues down to the South Yuba river, near Hoyt's crossing. The developments to the north of the Spanish mine are slight. At the Spanish mine there is a shaft 300 feet deep on the incline. The vein is of variable width, averaging 3 feet, and in places heavily sulphureted. The next developments are at the old Merrifield mine and on the north side of Deer creek. South of Deer creek, in the Providence mine, the vein is most extensively developed by a shaft 1800 feet deep on the incline. The vein is characterized by heavy masses of quartz, up to 10 feet wide, and contains much sulphurets, there is also a considerable percentage of silver in the ore. The granodiorite on both sides of the vein is usually greatly broken and crushed and is traversed by numerous seams parallel to the vein. Sometimes the crushing has gone so far that the rock is converted to a schistose, chloritic mass. In certain places there are two or more veins, separated by zones of crushed granodiorite, the whole mass "between walls" attaining 30 feet in width. To the south of the Providence mine, beyond the point where the vein enters slate, the old underground works not accessible now, showed the vein to follow the contact for about 800 feet on the incline, as shown on the structure-section sheet. All this indicates beyond doubt that the force producing the Merrifield fissure was of unusual strength and that the resulting movement was considerable. From the relations mentioned it is believed that the movement along the dip of the vein must have been about 800 feet, and the fault is clearly an overthrust in which the hanging wall has moved up relatively to the foot wall.

(To be Continued.)

Gold Mining in Mexico.

The student of mineral statistics can scarcely fail to be struck with the recent increase in Mexican gold output. In 1893 the value of the gold produced was only about 3½ per cent of that of the silver. In 1894 it rose to about 14 per cent; in the next year the product increased from 14,896 pounds to 18,539 pounds fine gold. This year the figure is likely to be higher. The change is not to be attributed to a diversion of mining enterprise, created by any decline in the silver industry. For years Mexico has held the second position as a silver producer, but last year it rose to the first rank, with a reported output of 3,482,382 pounds, exceeding that of any other nation in the world. Nor is it that the country lacks other outlets for the employment of mining capital. Mexico possesses immense iron deposits; and, although the Boleo mines in Lower California continue to be the chief source, there are elsewhere a number of very promising copper lodes. Quicksilver mining is on the increase, and some new discoveries of cinnabar have been reported; tin and antimony exist. Lead, however, is won chiefly, if not entirely, in connection with silver, and mines of soft or non-argentiferous lead are so far scarce. But the most important mining work now in progress at several points is the exploitation of the coal deposits. It is in this industry, in the development of road and rail communication, and in the improvement in the mining code, with the reduction to taxes, that the enquirer finds a reason for the recent increase of the gold output. With cheaper fuel, the possibility of transporting heavier machinery to the mines, and improved methods of water storage, many auriferous properties that in the past did not pay are now being worked at a profit, and the industry in general is becoming a commercial success.

From a geological and mineralogical standpoint, the Mexican tableland, resting on a foundation of granite, seems to consist mainly of metamorphic formations, partly upheaved, and overlaid by igneous masses of all ages, chiefly represented by shales, greywacke, greenstones, siliceous schists, and unfossiliferous limestones. All these formations are alike remarkable for the abundance and variety of their metalliferous ores, as silver, silver-glance, gold and copper. The most valuable rocks are the argentiferous porphyries and schists in the central plateau and in Sinaloa, together with the auriferous deposits of Sonora, the extreme northwestern State. Some gold mines in this latter district have lately come under the writer's notice, and the information that he is here able to give may perhaps convey a rough idea of gold mining in this State, and serve as a comparison for similar enterprises in other parts of Mexico. The main auriferous vein system of Sonora runs north-northwest to south-southeast. The outcrops are often scanty. The lodes, which occur as contact deposits, also as independent veins traversing the country rock, vary greatly in width, in places being as narrow as 1 foot and again swelling to upwards of 100 feet. As usual, the ore bodies that are largest and most productive are often found as shoots or chimneys near the junction of a tributary with a main vein. But rich ore is also encountered in detached bodies or bonanzas of irregular shape and greater or less size, their origin being doubtless due to the number of feeders that cross or converge with the main veins at varying angles. The gold, for the most part, is not free milling, but is associated with silver, and debased by varying amounts of pyrites, copper and galena, the percentage of sulphides being ¼ per cent, occasionally rising to 12 per cent. In gold contents the ore is not high grade. In one of the properties referred to the assay value was 14 dwts. 16.3 grains per ton; in another group of mines the mean of seven samples was in refined or parted gold 15 dwts., equivalent to £3 3s. 8d., and in silver £1 5s. per ton. The usual method of treating the mineral is to hand pick, and send the high grade with the concentrates from the vanners, to the smelter. The medium ore is stamp crushed, amalgamated by the Boss system in pans and settlers, with concentration on Frue vanners. The low grade material is passed through breakers and rolls, screened, concentrated on jigs, and amalgamated on copper plates. The total extraction is about 80 per cent of the gold and 66⅔ per cent of the silver. In the case of the mines last referred to, the total cost of treatment appears to have been 41s. to 43s. per ton, of which mining was responsible for 16s. 8d. per ton. At present a large proportion of the fuel used in Sonora is wood. Under the Mexican laws the owner of a ranch is permitted to cut down on it all the wood he requires. To acquire an interest in a ranch is, therefore, the cheapest way of obtaining fuel. Palo fierro (iron wood), weighing 80 lbs., and mesquite, weighing 54 lbs. to the cubic foot, are excellent firewood, and average, with delivery within reasonable distance, about 13s. to 14s. per cord. Mining timber is brought by sea to Guaymas, in the Gulf of California. Ocean freights from Europe to Guaymas vary slightly with the season, but are always low. From Guaymas a railway traverses Sonora to Nogales on the northern frontier, and thence communicates with the lines of the United States. Some of the country roads are passable by carts drawn by mules, but arroyas or dry watercourses are frequently troublesome obstacles for carts, and a very large number of the tracks are open only to mules. Carts carrying, say, two tons cost about 6d. per ton-mile; mules, taking 300 lbs. per animal, cost perhaps 1s. per ton-mile. Machinery, etc., is sometimes slung, and carried by Indians. Native labor is fairly cheap, miners earning about 3s. to 4s. per day, laborers from 2s. to 3s., engineers from 8s. to 10s., carpenters and blacksmiths 5s. to 6s. High-class mechanics, blacksmiths, carpenters, millmen, etc., have to be brought from the United States, and paid accordingly. There are, as might be expected, considerable water difficulties in Sonora, in most cases to be overcome only by pumping, well sinking, and storage. In the three months of the wet season, the rainfall, never very heavy, is sometimes extremely scanty. The river system, running roughly north and south, comprises the Rio Magdalena, flowing by Altar; the Rio Sonora, pass-Hermosillo; the Rio S. Miguel, a tributary of the Sonora; the Rio Matape, entering the sea slightly south of Guaymas, and the Rios Yaqui, Mayo and Fuerte. The laws regarding water rights, acquirable by the purchase of river-side property, are complicated; and the amount of water that can by this means be obtained is limited. The present main groups of Sonora mines are situated in the vicinity of Sta. Ana and of Hermosillo, both of which towns are on the line of rail. The writer understands that within the last few months two French companies have acquired gold mining properties in the San Pedro range of Sonora, and that another company is in contemplation. It is also said that numerous American prospectors are busily at work taking up known mines and seeking for new ones, with a view to presently exploiting auriferous Mexico.—Capt. C. C. Longridge, in the London Mining Journal.

Edison on Diamond Making.

Thomas Edison, in an interview with a representative of the New York *Herald*, lately claimed to have anticipated Prof. Moissan in the manufacture of diamonds. He said: "I succeeded in producing infinitesimally small diamonds—diamond dust, in short. That these were true diamond crystals I ascertained by sweeping them upon a bit of leather, when I found they would cut into a sapphire. I see that Prof. Moissan has succeeded in making rather larger ones. But all these experiments were with me simply a scientific pastime. The production of gold and of diamonds would be of no practical value to the world unless, indeed, the diamonds were black; then I'd jump at them like trout to bait. No white diamonds for me, but niggers; the blacker, the harder, and the uglier the better. That would be worth while. Black diamonds are of enormous practical value. If we could get enough of them at low enough prices, we could cut canals right through miles of solid granite. But white diamonds would be of no use to me. And if the time ever comes when white diamonds can be produced by shovelfuls in a chemical furnace, they couldn't be of any use to anybody. Not all the lawmakers in the United States or in the world could make them worth more than 50 cents a peck. And it's the same with gold. I believe it is not only a possibility, but a probability of the future, that we will discover a process of transmutating the baser metals into gold."

THIS is the first time that the notorious "house organ," by which is meant the trade journal ostensibly conducted on its merits, but actually operated by a mercantile or manufacturing concern which uses it to advertise and push the sale of its goods—this is the first time, so far as we can recollect, that it has risen to the importance of being mentioned in a President's message. It is an extremely rotten and corrupt institution and is unworthy to be classed as a periodical. However, it masquerades thus in order to be admitted to the mails at 1 cent a pound. Without this sustaining privilege it could not be run at all, except at serious loss. The names of these house organs are legion.

Scientific Progress.

Aluminum Manufacture.

The product of aluminum in the United States increased from 550,000 pounds in 1894 to 920,000 pounds in 1896. In 1854, when the first works for its manufacture were started, the price of aluminum was from $2 to $4 per ounce. In 1882 this had fallen to $12 to $14 per pound, and in 1891 the price was about $1.70 and in 1893 from 55 to 66 cents per pound.

Alfred E. Hunt, in the report of the United States Geological Survey, just published, on "The Mineral Resources of the United States," speaking of its manufacture in Europe, says: So far in the development of the metallurgy of aluminum, France, England, Germany, Switzerland and the United States have been the only countries of the world dividing the honors. In the future the countries having good water powers will undoubtedly compete for the world's trade; and already the Aluminum-Industrie-Actien-Gesellschaft have secured, in addition to another power on the Rhine near Basle, Switzerland, a water power in Austria for a future development of works. In Russia there are several large landed interests with water powers, the advantages of which they are considering for the manufacture of aluminum. In Norway and Sweden there are also good water powers which the new developments in electro-metallurgy are bringing into favorable consideration. A plant in Norway, at Sarpsfos, has been definitely decided upon; this plant having a capacity of 10,000 horse power steadily during the entire year, the fall of the water which it is proposed to utilize being about 80 feet.

The disadvantages of most of the European water powers that would seem to be in other ways available are their periods of low water in the winter and early spring season, when the snows of the mountain glaciers which feed their headwaters, where water powers are situated, are frozen up. Owing to the comparative slowness of operation of the present successful electrolytic process of manufacture of aluminum, continuity of operation seems to be an almost necessary prerequisite to economical manufacture.

As to the methods of manufacture, all the aluminum now being made in the world is practically made by the general process of the electrolytic decomposition of alumina dissolved in a molten flux consisting of the fluoride of aluminum together with the fluoride of a metal or metals more electro-positive than aluminum, the idea being to use a flux which dissolves the ore with the most facility, remains molten the longest, is least subject to decomposition, allows the best circulation around the anodes, and is the easiest to manage continuously without caking up.

Bauxite has become recognized as the best native ore of aluminum, and as the purification of its contained alumina from silica, oxide of iron and titanic acid has shown that the silica is the *bete noir* of the operation, the location of bauxite rich in alumina and at the same time low in contained silica is an important factor to the manufacturer of aluminum.

THE idea that compressed air mixed with steam in the cylinder of a steam engine would be productive of economy has been endorsed in times past by engineers of eminence. Some ground for this belief exists in the known fact that the presence of the air in the steam decreases the amount of cylinder condensation. To find the exact effect of such a mixture upon the economy of an engine tests were recently undertaken at Stevens Institute, the engine used for the purpose having a single cylinder $7\frac{5}{32}$ inches in diameter and 14 inches stroke, running from 200 to 228 revolutions per minute and cutting off at one-quarter of the stroke. The tests were in four series, as follows: First, tests 1 and 1A, using steam alone; second, tests 2, 2A, 3 and 4, using air and steam, the air at a temperature of 70°; third, tests 5, 6 and 7, using steam and air, the air being heated to about 540° Fahr., corresponding to the temperature of adiabatic compression; fourth, tests 8 and 9, under the same conditions as 5, 6 and 7, except that the air orifice was enlarged to twice its original diameter. The steam pressure averaged about 90 pounds. In series 2 and 3 the air entered the steam pipe through a hole $\frac{1}{10}$" in diameter, and in series 4 the orifice was $\frac{1}{8}$ of an inch. The air admitted varied from $1\frac{1}{2}$ per cent (by weight) of the steam to $8\frac{1}{2}$ per cent. The indicated H. P. averaged about 20. The water per indicated H. P., without air, averaged 32 pounds. When air was used it averaged 30.7 pounds. The best results gave a saving of about 7 per cent, but this is almost exactly offset by the power required to compress the air, so that the saving per net H. P. is nil.

Transmission of Earthquake Motion.

In a recent lecture delivered by Professor John Milne, formerly of the Imperial University, Tokio, to the members of the Edinburgh Philosophical Institution, on "Earthquakes and Volcanic Disturbances," the author stated that the chief feature of the lecture was the announcement of the fact that an earthquake occurring in any portion of the earth could be recorded in any other part by means of suitable instruments. He showed diagrams of earthquakes recorded in England which had originated in Japan. The motion came from Japan to England in sixteen minutes, and therefore in all probability traveled through the earth rather than around its surface. This high velocity with which motion was propagated indicated that the earth had a higher rigidity than had hitherto been supposed; in fact, the globe transmitted motion more quickly than a ball of glass and steel. In order to learn more about the nature of the interior of the earth, he suggested that there should be placed on its surface at intervals of from 1000 to 2000 miles instruments for picking up the unfelt earthquake motion. The cost of these installations would be about $250 each, and twenty of them would be sufficient. With such an equipment we might learn more about the nature of the earth on which we live in a period of three years than we should by a hundred years of speculation.

PROFESSOR FRANK CLOWES recently delivered a lecture on the explosibility of acetylene, remarking that the value of acetylene as an illuminant and the discovery of its ready production from calcium carbide have led to the manufacture of this gas in some quantity, and acetylene will probably be dealt with in still larger volume in the near future. It becomes, therefore, important to devise methods for detecting its presence in the air, arising from leakage and escape, and to measure the percentage of the gas present at any place. It is also important to know what proportions of the gas, when present in mixture with air, will lead to explosion if the mixture should be kindled. The detection of small proportions of the gas will not be readily effected by its smell when it is prepared in a state of purity. At present the smell is made more pronounced by the impurities which the commercial gas contains. Further, the smell will not in any case furnish a means of measuring the proportion present in the air.

THE most powerful lighthouse in the world is now being built at Penmark point, in the Department of Finistere, France. The height of the tower is about 200 feet, which will enable it to be seen during the day from a distance of eighty miles in fine weather. The rotundity of the globe will prevent the rays from striking the eye directly at a distance of more than forty miles, but the sky overhead will be illuminated for forty miles more. The great illuminating power of the light is provided by a similar apparatus to that first used in France in 1829, at the Heve lighthouse. The principle is based on the fact that a flash of lightning lasting no more than one-tenth of a second suffices to produce on the retina its complete effect. The new lighthouse will send flashes of concentrated light over the ocean every five seconds, each flash lasting one-tenth of a second.

Mechanical Progress.

A Novel Method of Mining.

It has been known for many years that a deposit of sulphur existed in Louisiana, and several companies have endeavored, but failed, to make its extraction profitable. This deposit is at a depth of 300 or 400 feet, and is immediately overlaid by 160 feet of quicksand. One company tried to freeze the sand so as to sink a shaft through it, but did not succeed. It is now reported that a method has been devised for mining the sulphur which promises success. It consists in melting the sulphur and forcing it to the surface in a liquid state. Both the melting and the forcing upward are accomplished by the same agent, which is water heated, under pressure, to 335° Fahr. A hole is first drilled to the sulphur deposit large enough to receive a 6-inch pipe. Down the center of this pipe passes a 2-inch pipe; this smaller pipe has a series of holes opening into the larger pipe just at the bottom. A 4-inch pipe passes between these two but does not extend quite so far down. The annular space between the two outer pipes is closed by a stout partition at the lower end of the 4-inch pipe. Above this partition a series of holes is made through the walls of the outer pipe, and a similar belt of holes is also made at its bottom. Water heated to 335° Fahr. is forced through the space between the two outer pipes, and when it reaches the partition at the bottom of the inner one of these two it passes out at the upper holes and melts the sulphur surrounding the pipes. This melted sulphur is driven in at the lower holes and forced up, in the space between the two inner pipes, to the top of the well. To prevent the solidification of the sulphur on the way up, hot air is driven down through the inner pipe. The air passes out of the inner pipe at its bottom and ascends upward through the same channel as the sulphur. The pipes are sunk deeper into the bed of sulphur as occasion requires. The pipes are made of steel coated with aluminum. The sulphur flows from the well in a liquid state and is run into shallow vats to cool. It is then cut into blocks convenient for shipping. Much of the deposit is said to be very pure, reaching as high as 99 per cent of clear sulphur.—A. E. Tillman, in Cosmopolitan.

Effect of Concussion on Cast Iron.

In a paper before one of the Philadelphia technical societies A. E. Outerbridge Jr., chemist, expressed his dissent from the common theory that cast iron becomes brittle under repeated shocks. He was led to test the matter by noticing that a number of bars of cast iron, 1 inch square and 15 inches long, gained strength by being shaken for several hours in a box to clean them from sand, and, to test the matter still further, he prepared twelve more bars, six of which were tumbled in such a box for four hours, and these showed a strength 10 to 15 per cent greater than the six not thus treated. Experiments were then made by subjecting six to 3000 taps on one end with a hammer, the result being a gain in strength about equal to that exhibited by the bars in the box. The tapping produces what Mr. Outerbridge calls molecular annealing, which differs from annealing by heat in that it has no power to change the condition of carbon in the castings, or alter the chemical constitution in any way.

THE Bridal Veil Lumbering Co., in Oregon, not far from The Dalles, has a railroad upon which cars are not used. A train upon the road consists of an ordinary locomotive, such as are common on logging roads, and a string of logs, each log being as large in diameter as the boiler of the engine, or larger. Boards are nailed to the sleepers between the rails, and on these the logs slide. Except on descending grades, the boards are greased, and the train moves at good speed. Where the road is level or slightly ascending, the engine pulls the logs, and where it is descending it holds them back. At the mills of this company the manufactured lumber, regardless of size, is run into a flume, and this is carried about two miles to the planing mill and shipping yard, the flume descending in that distance about 1200 feet.

War Locomotives.

Armored locomotives and armored railroad trains for war service have been in evidence, more or less, for twenty years, if not longer, and England, in one of her early Egyptian campaigns, found them effective equipments for offensive as well as defensive operations in the enemy's country. Since that time such engines and trains have been under experiment and in actual service with various degrees of success, with every indication pointing to the probability of their becoming increasingly important factors in modern warfare. Sand bags, which were among the earliest armor used in this comparatively novel branch of military engineering, have been replaced by iron and steel, and the war locomotive of to-day is a decidedly more business-like structure than its makeshift predecessor. It is well represented in its latest form by two locomotives recently built for the Spanish. Both engines have cabs of heavy steel plate, capable of resisting rifle balls, and the windows and doors are fitted with steel shutters, having loopholes through which the guards can operate rifles or the machine gun which is to be mounted in the cab.—Cassier's Magazine.

FOR Michigan, a unique engineering feat is being accomplished in Iron county, over the Hemlock mine. Recently miners at work in a tunnel of the mine that extends under the bed of the Hemlock river were alarmed at seeing water dripping down from overhead. They refused to work in the tunnel any longer, and it soon became spread about that the Hemlock was liable to cave in at any time and let the river above rush in and drown the workmen. To prevent such a disaster a large dam is being constructed on the Hemlock river some distance above the point under which the mine tunnel runs. This will hold back the water and the workmen there are building a sluice—away from the dam over the mine shaft and some distance below it. The sluice will rest on two immense arches that will in turn be built up from the bed of the Hemlock river. It will be made of matchwood lumber and will not leak. After it is finished the water from the dam will be freed and will course over the sluiceway and the river bed below will be dry.

IT hardly seems as though an engineer who is up to date should persist in using one kind of oil throughout the mill, oiling light and heavy shafting, machinery, and high and low speed bearings and engines and gears with the same kind of oil, but this practice is followed by some concerns. It is not a good practice; it does not pay. No young engineer who has studied the matter fully will do so, unless he is obliged to do it by positive orders from the office. Sometimes these orders take the form of the lack of more than one kind of oil. Study the peculiarities of all kinds of oil. Note also the peculiarities of your machinery, and decide which kind of oil gives the best results therewith. Then, that point once determined, insist upon having the required brand of oil for each kind of work until some better kind is placed within your reach.

Electrical Progress.

THE principle of cataphoresis, or the driving of foreign substances into animal tissue by means of electric currents, has been adopted with great success in both medical and dental work. In these capacities it is employed principally in conjunction with cocaine, or some other anæsthetic, for the purpose of rendering the flesh or the tooth to be operated upon insensible to pain. The benumbing solution is forced into the tissue, and even into the obdurate sensitive dentine of the tooth, until no sensation whatever is possible for the time being in the region under treatment. A provision merchant of Rio Janeiro has hit upon the ingenious idea of applying this method to the preservation of meat. He immerses the meat to be preserved in a 30 per cent solution of common salt and passes through the whole a continuous current of electricity. In from ten to twenty hours the salting is said to be complete, and the meat is taken out of the bath and hung up to dry. For the guidance of those who might be disposed to try the method, it may be added that in working a bath of 3000 litres of brine in which 1000 kilos of meat may be immersed, the current may be of 100 amperes, with an electromotive force of eight volts. The electrodes must be of platinum, since, if other metals, such as zinc or iron, were used, the metal salts formed would be injurious.

DR. C. E. EMERY, before the American Institute of Electrical Engineers, said that the high-speed electric locomotive of the future will, like the steam locomotive, be a structure independent of the train; the motors will be hung on the frame independent of the driving wheels, and the same as well as the driving wheels connected by side rods. To obtain proper room under such conditions larger driving wheels will be employed than the wheels of an ordinary car. This will so extend the wheel base that it will not be safe to run at high speeds without the leading truck, the same as on an ordinary locomotive, and in fact the electric locomotive will in all its general features be a steam locomotive without the boiler, with motors substituted for the steam cylinders. In this way, and probably in no other, can the flexibility of the present steam locomotive be obtained.

THE four largest dynamos yet built are now being placed in the Allegheny County Light Company's plant, Pittsburg. Each is 30 feet long, 24 feet high and 4 feet wide. The armatures alone are 16 feet 8 inches in diameter, and each weighs more than thirty tons. Each is directly mounted on the shaft of a 2000 horse power Westinghouse double acting compound, marine type. The shafts are 18 inches in diameter, and where they pass through the bearings they are 13 inches in diameter. These bearings are 3 feet long. These four machines will each produce 20,000 incandescent lights and 2500 arc lights. These great machines made an enlargement of the building necessary, and a new structure was erected over the old one.

THE great opening in the present state of the electrical industry is for design rather than new invention. The man who can design machinery in such a way as to save 5 per cent in the cost of materials or labor is always valuable. He must be versed in detail, and capable of readily grasping the commercial details of the subject. The question of commercial efficiency also comes largely into the design, and the manufacturers who can maintain the reputation of their apparatus for smooth working and durability are sure to succeed. Hence, says the *Electrical Engineer*, while striking departures from existing practice may bring success to one man, two others will make fortunes by being able to get the best results at the least cost from every-day types.

IT is reported from Calumet, Mich., that the Calumet & Hecla Company will soon sink three new shafts on its part of the amygdaloid vein, which a drift, three years ago, showed to be about as rich in copper ore as the same vein in the Osceola mine. These new shafts, with the new Red Jacket shaft, will, it is said, increase the product to 130,000,000 pounds of copper a year.

Practical Information.

Making a Half-Tone.

How such engravings as that of the sawmill, run wholly by electricity, on this page and also on the first page of this issue, are produced, is sometimes the subject of inquiry. In the first place, a glass screen with diamond-scratched lines, ruled at right angles so closely together that the spaces can hardly be distinguished, is placed one-eighth of an inch in front of the sensitive plate in the photographic camera. Looked through, the effect is much the same as gazing through a sieve. These lines reappear in the half-tone engraving when printed.

The photograph, or wash drawing, from which the photo-engraving is taken, is photographed in the usual way and with the usual sensitive plate, with the previously described screen in the camera between the plate and the picture. This produces a negative of the picture, showing the fine cross lines represented by clear glass. Now, in order to have the same position of the object in the engraving as in the original, the film of the negative is treated to one or two coats of collodion, which gives it a sufficient consistency to permit of its being removed. This film is transposed to the opposite side of another glass. After careful mounting, this new negative is ready to be used as a medium for printing on the zinc plate.

The face of the plate is buffed to the highest degree of polish, then coated with a solution of albumen and gelatine, then sensitized with bichromate of ammonia. It is then dried and placed in the printing frame, the coated side next to the negative film. The case is then exposed to the sun or light three to five minutes, or to an electric light for fifteen to twenty minutes. The light passes through the heavy inch-thick glass of the printing frame, then through the negative, striking the sensitized plate, and decomposing the chemicals wherever it may fall.

Where the plate is protected by the shadows and half-tones of the negative the sunlight has less effect, and where the shadows are dense it has no effect. This plate is then removed from the frame in a dark room and carefully washed in running water for several minutes, then dried and heated until the picture appears of a dark-brown color. The back of the plate is rubbed with wax while hot, to protect it from the etching solution, which is made from perchloride of iron.

The picture on the plate is acid proof and the etching solution eats only where the plate is unprotected—that part which is blank in the finished engraving. The plate is allowed to remain in the acid bath for about fifteen minutes, or until sufficient depth is obtained. It is then washed and is ready for the router and the printer.

A CORRESPONDENT of the *Practical Engineer* describes a novel method of removing boiler scale, as follows: "I have used turpentine on the scale with a sponge in the dark for fifteen minutes, then got out and applied a light, placed on the end of a 12-foot bar, keeping myself well out of the boiler for safety. I have done a day's work in half an hour. The instant heat of the turpentine shatters the scale immediately." That sounds all right, but is not cordially recommended.

UNITED STATES CONSUL NORRIS, at Ghent, has reported an interesting fact to the State Department regarding the manufacture of incandescent lamps. It is that the most expensive product in the world is the charcoal thread employed in the lamps to furnish the light. This will be interesting news to the people who use electric light nightly without being cognizant of such proximity of wealth. It is, for the most part, manufactured at Paris and comes from the hands of an artist. This product is sold at wholesale by the gramme, and, reducing this price to the basis of pounds, it is easily found that the filaments for lamps of 20-candle power are worth $8000 per pound, and for the lamps of 30-candle power the fabulous sum of $12,000 per pound. The former have a diameter of twenty-thousandths of one millimeter, and the latter less than one-fifth of this size.



THE FOLSOM ELECTRIC SAWMILL. (*See page 25.*)

Coast Industrial Notes.

—C. A. Martin of Reno, Nev., shipped twelve carloads of cattle to Oakland, Cal., this week.

—The contractors on the Astoria-Globe railroad in Oregon have 300 men at work and will soon increase the number to 500.

—Governor Sadler of Nevada recently sold 1500 head of stock cattle at $18 per head to McCormick Brothers of Stockton, Cal.

—Building the Salinas, Cal., beet sugar factory has begun. It comprises a quadruple mill, four sets of diffusions, each 250 tons daily capacity.

—The S. P. R. R. Company is going to build a rock-crushing plant at Truckee, Cal. It will be run by electricity and the crushed rock will be used to ballast the road-bed through the snowsheds.

—The largest oak wine vat in the world has been set up by the California Wine Association at the Lachmann cellars on Brannan street, San Francisco. The Heidelberg cask has a capacity of 50,000 gallons; the San Francisco one holds 80,000 gallons.

—The Suisun, Cal., bonds of $42,000 for a new water system have been sold. Work will commence next month. Water will be brought a distance of eight and two-thirds miles to town, the source of supply is reported capable of a daily flow of 300,000 gallons.

—The tunnel through the Cascade mountains in Washington for the Great Northern Railway will be 2.49 miles long from Tunnel City, the west portal being at Wellington. It will be about 15 feet wide, 23 feet high, and lined with brick or stone where necessary. The estimated cost is $2,000,000.

—Cotton is now being carried through San Francisco across the Pacific to Japan, there made into cloth and reshipped here for sale. The old Pioneer Woolen Mills of this city, recently dismantled and carried to Japan, are now turning out woolen goods that come into competition with California manufactures.

—On the 31st ult. H. T. Scott of the Union Iron Works and Minister Hoshi of Japan signed a contract for the former to build for the Japanese government a steel cruiser of 4760 tons burthen, to cost about $1,500,000 and to be completed and delivered December 31, 1898. An illustrated description of this cruiser appeared on page 397 of the issue of November 14, '96.

—The Los Angeles *Times* says the oil industry of southern California is full of promise. Important development is being made in the Los Angeles oil field, and flattering reports are coming in from Whittier and Fresno. From present indications, oil of the lightest gravity may reasonably be expected from one or more of the southern California strata. The market is quiet. Prices are ranging from 90 cents to $1 per barrel at the well tanks in the local field.

—The Mexican Government is about to improve the harbors on the west coast. Arrangements have been made to raise a considerable sum for this work, in addition to the $5,000,000, for the improvement of Coatzacoalcos and Salina Cruz, the eastern and western termini of the Tehauntepec road. In accordance with the Government's plans an engineer, Arthur F. Wrotnowski, has been sent to the western coast to inspect all of the harbors and determine which shall be improved and to what extent.

—The Utah & California Railway Company has been organized for some time to build a road from Milford, Nev., to Los Angeles as soon as the Oregon Short Line shall have been segregated from the Union Pacific. The Oregon Short Line runs from Salt Lake City to Milford. The road between Milford and Los Angeles will run through coal and lead ore districts in southwestern Utah. Right of way is said to have been secured by Oregon Short Line people for most of the distance between Milford and Los Angeles, which is about 400 miles. Work will be begun immediately after the separation of the Short Line from the Union Pacific.

—In 1886, 1928 tons of anthracite coal were imported at San Francisco; the importations increased every year; in 1895 they amounted to 50,930 tons, for the first eleven months of 1896 they amounted to 81,255 tons. From 1862 to 1864 the duty on anthracite coal was 60c a ton; from 1864 to 1870 it was 40c, and since then it has been on the free list, for the reason that the quantity of anthracite coal produced outside the United States was, prior to 1870, so infinitesimal that it was considered an absurdity to retain it on the dutiable list. Since then extensive fields of anthracite have been discovered near Swansea, Wales, from which the California importations come.

—Among California products for the year 1896 were: Gold, $16,160,613.44; borax, $800,000; petroleum and bitumen over $1,000,000; salt, $130,000; mineral waters, $400,000; natural gas, $150,000; quicksilver, 30,743 flasks worth $36.50 per flask; beet sugar, 46,000,000 pounds; wheat, 28,682,200 bushels; brandy, distilled from grapes, nearly 1,000,000 gallons; barley, 10,800,000 bushels; beans, 68,000,000 pounds; raisins, 84,000,000 pounds; dried fruit, 148,500,000 pounds; dried prunes, 51,000,000 pounds; canned fruits, 1,000,340 cases; wool, 24,500,000 pounds; hops, 52,000 bales; oranges, 1896-7, estimated, 8375 carloads; 1896, 2,512,500 boxes; butter, annual product, 48,000,000 pounds; cheese, 16,000,000 pounds; wine, receipts at San Francisco, 12,914,670 gallons; brandy, 163,650 gallons; provisions, $5,500,000; value of nuts, $350,000; powder, 12,000,000 pounds. The total gold product since 1848, is figured at $1,368,429,278; quicksilver since 1877, 810,767 flasks; gold and silver since 1848 $1,475,434,107. Seventy-six thousand acres were set to orange trees and 70,000 to prunes. There are 3,900,000 acres of land under irrigation. There are 340,000 milch cows in the State and $10,600,000 invested in dairies.

Personal.

A. N. BUTTS of Angels Camp, Cal., has been at Mercur, Utah.

MARCUS DALY is going this month to Mexico to look up some mining property he is interested in.

CHRIS MALLON succeeds A. F. Kipper as superintendent of the Brunswick mine, Grass Valley, Cal.

EDMUND DE STOUTZ, who has been in charge of mines near the Rio Tinto, in Spain, has been appointed superintendent of the Continental copper mines at Globe, A. T.

LATEST cable advices to this journal from Russell L. Dunn, who went to Siberia last July for a French mining syndicate, indicate that he will shortly return to Paris.

EMILE M. DU MARIAS, a mining engineer, and Emile P. Enders, editor of the *Revue Economique et Financiere* of Paris, representing French interests, are visiting Utah mining districts.

JAS. A. POLLOCK, of Salt Lake City, Utah, the most prominent mining stock broker of that section, who has been visiting his mining property in Tuolumne Co., is in this city to select some improved mining machinery.

V. M. CLEMENT has returned from South Africa and last week was in Utah, where he joined Charles Butters. In 1888 Mr. Clement was at the Bunker Hill and Sullivan mines in Idaho, and later joined John Hays Hammond in South Africa.

MR. P. GEORGE GOW has resigned the local management of the Gold and Silver Extraction Company of America, Limited, and will in future devote his attention to his mining business, he being manager and part owner of the Jumper and New Era mining property. Mr. Bertram Hunt succeeds him as local manager of the cyanide company's business.

Recent California Mining Incorporations.

Norwegian Mining Company, San Francisco; capital stock, $1,000,000—$250 subscribed; W. C. and R. S. Murdoch, H. F. Emeric, T. W. Wells, F. Enzensperger.

Holiday G. M. Company, San Francisco; capital stock, $1,000,000—all subscribed; G. W. Baker, T. J. Parsons, W. A. Jacobs, J. A. Stephens, S. K. Thornton, R. B. Harper, G. T. Davidson.

Tryon G. M. Co., San Francisco; capital stock, $2,500,000—$2,000,000 subscribed; C. W. Tryon, W. B. Lee, J. S. Drake, G. C. Tryon, H. H. Lee.

Gerrymander G. M. & M. Co., San Francisco; J. S. Joseph, Sonora; B. Joseph, E. Epstein, J. J. Schultz, M. F. Lowenstein, J. D. Abrams, W. H. Metson, A. S. Wollberg, San Francisco; S. H. Rich, Oakland.

Glenn Cliff M. Co., San Diego; capital stock, $1,000,000, of which $151,950 has been subscribed; F. Kinney, G. W. Anderson, C. L. Warfield, R. M. Jones, San Diego; I. E. Hill, Los Angeles.

American M. & E. Company, San Francisco; capital stock, $250,000—all subscribed; W. Violman, F. McCue, Lewiston; W. H. Harrison, E. W. McKinley, C. A. Webster, San Francisco.

COLORADO'S GOLD FIELDS.

Millions Upon Millions of Dollars in Gold Have Been Added to the World's Wealth.

It is a well-known fact that the richest and most famous gold mines in the known world are those of Colorado, many of which are paying to fortunate investors millions of dollars annually in dividends. Some shrewd persons who invested only a few dollars are now receiving hundreds and thousands in profits, and, judging from present indications, there are more desirable chances to invest just now than ever before. New mines are discovered daily and old ones strike richer veins of gold.

In order to meet the great demand for reliable information about mines and mining camps, one of Denver's oldest and best known publishers has just issued a handsomely illustrated book accurately describing every mining camp in the entire State of Colorado, giving scores of truthful photo-engravings of famous mines, mountains, cities, etc. Cripple Creek, the world's wonder, is fully described; also a correct map of the district. Narratives of how many poor people have become wealthy by judicious investments in gold mines, and sketches of former prospectors who are now fixed for life. Tells how to avoid unscrupulous brokers and sharpers. The volume has been carefully compiled by a disinterested author and every statement made is guaranteed to be true. All terms and phrases of miners fully explained; tables showing the State's production of gold and silver for 35 years past. The publisher will send by return mail a copy of the above great book upon receipt of $1 (currency or stamps), which also includes a full-paid yearly subscription to his big 56-column weekly family paper, the *Illustrated Sentinel*, of Denver, Colorado (established 1890). Clubs of 6 and six books, $5. The paper contains each week all the latest mining news and illustrations of Rocky mountain scenery, also true stories of love and adventure.

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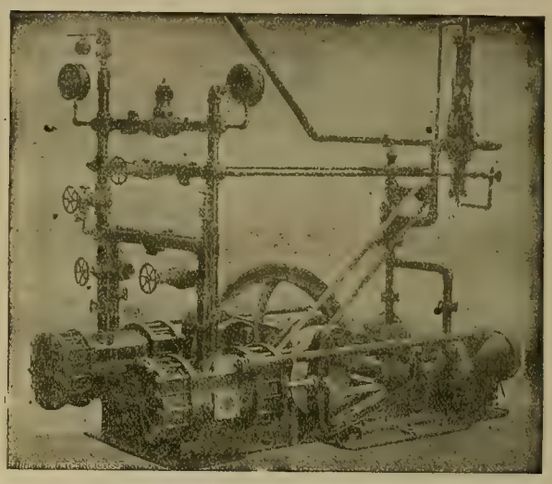
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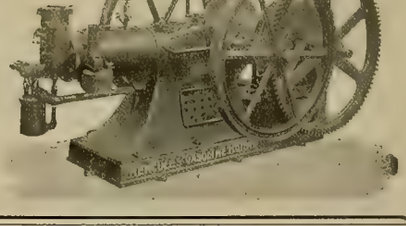
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Mining Summary.

CALIFORNIA.

Amador.

Republican: In the Argonaut an ore shoot at least 300 feet in length has been uncovered in the 1250-foot level. It is not all high-grade—indeed, most of it is low-grade ore. There is little question that the erection of a 40-stamp mill will be pushed ahead in the spring.

Record: Superintendent Porter has day and night shifts engaged in driving ahead the three tunnels to tap in depth the east vein of the Balliol Mining Company. They will supply the mill by cars filled from ore chutes located in the tunnels, and these will be supplied from the large ledge by blasting in an open cut, the ore falling into the chutes from the bottom of the main pits. Mr. Porter claims that he can mine and mill the ore at a cost of 60 cents per ton. It is expected to start the new 40-stamp mill by February 1.

Ledger: J. E. Dye, manager of the Jackson E. and D. Co., has sold a three-fourths interest in the '49-Flat placer claim of J. C. Bell and others.

The Oneida Mining Co. has bonded or bought the Eureka property at Sutter Creek. This mine has not been operated for twenty years. The sha t had been sunk about 2200 feet and levels opened when the works were consumed by fire, causing the abandonment of further operations.

At the Mitchell mine, near Railroad Flat, a 10-stamp mill has been completed. Crushing is expected to begin immediately.

Another strike has been made in the Kennedy mine. A few weeks ago on the 1950-foot level a body of high-grade ore 8 feet wide was cut. An upraise was made on it. As the workmen raised the ore body grew narrower, until at the height of 40 feet it pinched out. A drift was then started for it on the 2100-foot level, where the bonanza was cut again, but at this place it was 20 feet wide, with a rich streak on the hanging wall. A drift was also started north on the ledge at the 900-foot level, calculating to run it to the Oneida line, the adjoining mine, a distance of 1300 feet from the north shaft. At a distance 800 feet from the shaft they cut a chute of $15 rock.

Butte.

Mercury: A large tract of land in the vicinity of the Magalia mine on Magalia ridge has been bonded to Edmund Harvey, the managing agent of the English syndicate now operating the Banner and Pete Wood mines and owner of the Golden Feather. He proposes to test the ground with a drill and discover, if possible, the deep channel which is supposed to run through the Magalia ridge. George H. Evans is general manager for the syndicate.

The Pete Woods mine has reduced the force of men to sixteen. The tunnel will be driven 75 feet farther into the mountain, when it is expected the channel will be tapped.

Mercury: At Cherokee over one hundred men are engaged in the claim of the Spring Valley Gold Mining Co. on leases. Thomas Vinton employs forty-five, and three Portuguese companies, in partnership, supply the remaining number.

Register: A Chicago company has bonded the Robinson or Minto mine in Granite Basin and a few days ago loaded three six-horse teams with 13,000 pounds of freight and supplies for the mine. The company will sink a shaft 150 feet and make other developments. There is a 20-stamp mill on the property.

The Wiley mine is being fitted up for work.

Enterprise: At Butte creek the mining prospects are more promising now than they have been for many years past.

Gale and Heppy are opening a rich claim at the Narrows. Mr. Hooper will soon have his claim on Centerville Flat in full blast.

Calaveras.

Citizen: The work of retimbering and repairing the Stickle shaft has been completed. A full force of men is now at work.

The Great Western mine, owned by Frank Baumhogger, started up with new machinery last week.

At the Pine Log twenty-five men are employed. Sinking has reached a depth of about 600 feet.

El Dorado.

(Special Correspondence).—The Septimus Development Company is moving rapidly in the Gold Note and Philadelphia properties. The shaft is 350 feet, and from this point the drift south has reached 150 feet. The hoist is run by steam, the pump and sawmill by water.

Deuch & Craddock are running a tunnel on the old Hattie mine, near town. The vein is from 2 to 4 feet.

The American River Land & Lumber Company, whose great timber fields are about ten miles from here, have 6,000,000 feet of logs in the river, and they expect to have 3,000,000 feet more by April 1st, when the logs will be floated to Folsom. The sawmill is operated by electricity.

The New Victor quartz mine started their 5-stamp quartz mill January 1st. Their shaft has reached 150 feet, and a tunnel, on a vein of from 2 to 5 feet, has reached 400 feet.

John Ewarts, who for years has been a successful prospector, has again found a good gravel property quite near town.

The shaft on the Big Four, near Garden valley, has reached 65 feet. The drift south is 46 and north 50 feet. The vein is in 2½ feet of good ore.

Placerville, Jan. 4th, '97.

Gazette: Mrs. J. W. Harrison has bought from T. G. Bilty and W. F. Herrick the Garfield mine at Greenwood, and will reopen the lower tunnel, which has been abandoned for years. The tunnel extends in over 500 feet, and there is a ledge 20 feet wide.

Mountain Democrat: The Uncle Sam mine has recently received a lot of tools and lumber to build a shaft to run from the west tunnel.

Inyo.

Register: Capt. J. W. Kelly of Bodie has bonded the Sanger-Danielson copper claims near Saline valley and will develop them.

Kern.

Los Angeles *Times*: At Randsburg the assessment work on all locations made prior to 1896 is being pushed vigorously. Nearly every hitherto idle man in camp is at work, and the sound of blasting is heard continually day and night.

The lack of milling facilities retards work on the mines. At Koehn Springs another five stamps will be put in operation soon in addition to the five which have been running since last summer. At Cow Wells there is a great deal of ore on hand ahead of the milling capacity of the place. There are several mills going up there, which will add at least twenty stamps, together with one cyanide process. The price remains the same, however, and no low-grade ores can be handled until the capacity of the mills equals or exceeds the supply of ore.

At Koehn Springs the water comes to the surface and the supply is said by an engineer who has examined it, to be equal, with a little development, to 600 inches.

The Southern Pacific Company is considering the advisability of building sixty-five miles of road between Mojave and Randsburg.

Madera.

Mercury: A three-quarter interest in the Syndicate mine, situated near Grub Gulch, Madera county, has been sold. Immediately after the sale rich ore was struck in the shaft. The party purchasing the property is now in San Francisco arranging for machinery for a 10-stamp mill to be placed upon the mine.

Mono.

Chronicle-Union: The consolidation of the best mines in the Bodie district under the one management—of the Standard Consolidated—was a move in the right direction. Next spring there will probably be erected a powerful electric plant on the river a few miles below Bridgeport, for the furnishing of power for the economical working of the series of consolidated mines. In the Bodie district many of the old claims that were familiar in the "boom days" of '78 and '79, but which have lain idle for years, are falling into hands that will work them with more or less energy during the new year, the new cyanide process having given miners more encouragement to work and develop their properties.

Good reports come from the Lundy district of rich strikes in the May Lundy mine.

At Bridgeport the travertine quarry will be worked to a greater extent than ever, as this material will be wanted for inside decorations in fine buildings erected in San Francisco.

The Dunderberg mine and mill will be under full headway at the commencement of the new year.

Nevada.

Tidings: Thos. Nolan has bonded his mining claim on Canada Hill, near the Mayflower, to W. E. Fisher of San Francisco, who will at once organize a company with the intention of developing it.

A bond on the Ellison gravel mine has been given to Geo. Fletcher and John F. Kidder of Grass Valley. The parties bonding commenced work several weeks ago. An incline shaft is to be sunk into the hill.

Union: The New York mine, the principal owners of which are Dr. S. M. Harris, James Burke and James Feeney, has been bonded to a company represented by Henry Power. The New York is situated northeast of the Pennsylvania. It is expected that as soon as Mr. Power returns from the East active work will be commenced.

Transcript: At Washington the Tom Boy ledge is situated on the mother lode and has two pay shoots in it. It is parallel with and 2500 feet east of the Giant King and Worthley & Company's mine. The property has been bonded to W. S. Bell, who will soon begin work.

Placer.

Sentinel: The Wise & Partridge mine at Bruce Canyon consists of a location on a porphyry dike or ledge, which is about 100 feet in width. The ledge runs from north to south and is cut by innumerable seams running diagonally across it. The formation is very soft, a stream of water cutting it very readily. The owners have worked the mine by sluicing for the past three years and it has paid them handsome returns. From a recent seven days' run of fifteen hours per day, with two men, they cleaned up forty-six ounces of gold.

Sunny & McLennan of San Francisco have a working bond of $12,000 on the George Nissen porphyry ledge.

E. W. Chapman, who recently purchased the river claim, comprising about a mile of Bear river lying above the dam of the South Yuba Company, near Colfax, is negotiating for several claims above his.

The Eureka tunnel is now in 1805 feet.

Plumas.

Independent: J. P. Massey, in the early '70s, located a copper claim at Poker Flat, which he soon abandoned. Lately he returned, relocated it and has interested in its development an English syndicate—the Lancashire Development Company. It is the intention of this company to develop the property sufficiently to demonstrate its permanency before proceeding with the erection of extensive reduction works, but in the meantime they have acquired possession of about a thousand acres of gravel land in the McRea ridge which will soon be opened.

San Diego.

The Los Angeles National Bank last week received from the Golden Cross mine three bars of gold bullion aggregating 1374 ounces, valued at $20,000. This represents a twenty days' run, the daily output of the mine averaging nearly $1000. Last month's clean up netted $26,000, and the preceding month $29,000. The bullion is usually shipped from the mine to the Los Angeles Bank to be forwarded by the bank to San Francisco.

Shasta.

Free Press: At Igo Peter Dean of San Francisco has decided to reopen the Hardscrabble mine.

Senator John P. Jones of Nevada has been running a tunnel in a mountain up the creek, and will soon begin taking out ore. The tunnel is now in 750 feet.

A. C. Hamilton of Santa Monica has purchased the Milkmaid mine from John Sonter for $20,000. Mr. Hamilton, who is a brother-in-law of Senator Jones, will at once develop the property and take out the large body of ore in sight.

Sierra.

Mountain Messenger: C. P. Saxton has made application to the U. S. Debris Commission to work the Saxton mine near Genesee, by hydraulic process, to deposit tailings in Little Grizzly creek.

Siskiyou.

Journal: The North Fork of Salmon hydraulic claim has been started up, with a large force of hands, and there is an abundance of water to keep the work going until late in the summer.

Louis Scheld has a force of men working his claim on Yreka Flats in Greenborn gulch.

During the past two years, about $300,000 have been invested in Siskiyou mines. Among the most important sales of the past few years are the two Shinar mines on Thompson creek, one of which was purchased by the Seattle Placer Mining Company, and the other by a company of Colorado capitalists. Both companies have put in extensive hydraulic plants.

The Hunter & Simmons pumping plant at Shasta river is about ready to start up, and by the middle of January work will probably be commenced in the mine at the Simmons place, below Hawkinsville.

News: On the Nelson mine on the North Fork of Humbug, the ledge has been struck with a crosscut 200 feet in length. One tunnel is in 210 feet and the other about 125 feet. This ledge is a continuation of the old Spencer ledge which proved so rich, and the mine is being worked by a strong company.

Tuolumne.

Independent: At Soulsbyville the leaseholders of the Mountain Belle mine are sinking on the extension of the Wheal Perran vein. The rock encountered shows free gold.

The Wheal Perran mine has just been unwatered, preparatory to active work and equipment. This mine was in the early days very rich.

At the Soulsby mine the shaft is sunk now over 200 feet, and stoping is in progress from this level upwards. The 15-stamp mill is nearly completed.

The Black Oak is shipping for treatment to Selby & Co., San Francisco, large quantities of their concentrates, as well as their high-grade ore.

Superintendent Storm of the Junction mine has everything ready for his machinery.

Yuba.

Marysville *Appeal*: A deal has just been made by a Chicago syndicate whereby the property of the New Blue Point Gravel Mining Company at Smartsville, including the New Blue Point mine, thirty miles of ditch embraced in the water system and 2300 feet of tunnel which cost originally $300,000 will pass from the New Blue Point Company and Paddy Campbell to the investors within sixty days. The price paid is understood to have been $100,000 for a two-thirds interest in the property.

NEVADA.

Romanzo Trefethen, who superintended the erection of the mill at the Dexter Mining Company's plant at Tuscarora, says that they have ore enough in sight to keep the mill in operation for at least five years. The means for extracting the values from the ore in early days were very imperfect, and the result was that in the mill dumps are tailings of the value of $20 per ton. In these dumps or ponds into which they were discharged by the former owners, it is estimated that there are at least 9000 tons that can be successfully treated at a cost not to exceed 90 cents a ton. For the handling of these tailings the company has provided itself with a cyanide plant, while the crude ore is put through mills that save about 65 per cent of the values. At present the company is saving between 85 and 90 per cent of the contents of the ore with the use of the mills and cyanide plant, and that the saving will be increased the present season is now practically assured. The ore in the Dexter varies in its valuation from $8 to $560 per ton in silver and gold, while in one level is a breast that averages over $70. On the main dumps are over 30,000 tons of milling ore.

White Pine *News*: The Star Mining Company are pushing work with all the men they can work to advantage.

Yerington *Rustler*: The Messrs. Bliss have been at Dayton to consider the question of working the mines on the flat, if they can find a suitable place to cut to the Carson river.

At Silver City the Pollard mill is again crushing rock.

The new owners of the Succor mine have resumed work on the north end.

OREGON.

Grant's Pass *Mining Journal*: Van Dorn brothers have a giant and 600 feet of pipe for their ground on Pickett creek. Mr. Woodcock of Kerby has purchased a giant for a placer mine on the Illinois. Campbell & Gould, on Green's creek, are running their pipe and giant. Belding & Dowell are working their ledge on Green's creek. They have a 12-inch vein of $25 ore which has been traced on the surface for 500 feet.

Medford *Mail*: The mining interests of southern Oregon continue to attract a great deal of attention. People are constantly coming to examine the placer and quartz properties.

B. P. Dunphy has in hand 800 acres of placer mines on Gall's creek. They have been worked by two men for more than thirty years. The ditches to supply the water are complete, and two houses for workmen and a boarding house have been built.

Baker City *Bedrock-Democrat*: The last monthly cleanup at the Bonanza was $20,000, the result of twenty-six days run with twenty stamps.

The Climax mine, an extension of the Ohio, in Cracker district, is developing into a valuable property. G. W. Grayson, of the Virtue, is the owner.

The indications for a good placer season are flattering. The snow in the mountains is deep and made compact by the late rains.

WASHINGTON.

Spokesman-Review: James Woods and E. A. Stephens of LaGrande, Or., have purchased for $30,000 the Bull Frog in Okanogan county.

The Ivanhoe is producing considerable mineral from the 500-foot level. This ore is rich in native silver and is running well in gold.

The Allison group, which was sold to a Chicago syndicate some time ago, is also being worked successfully. A 150-foot tunnel has just been completed.

The Palmer Mountain Gold Mining and Tunnel Co. are prosecuting work on the big tunnel with a double shift of men. The rock through which the tunnel is driven is highly mineralized. They expect to cut the first ledge, which is exposed on the surface, in the next few weeks. This tunnel will be 3600 feet long and will attain a depth of 1300 feet and may eventually be continued clear across Palmer mountain, a distance of six miles.

The sale of the Bonanza Queen group of mines, near Silverton, has been consummated and Dennis Ryan of Minnesota has become the owner. It is said the price paid in cash was $250,000.

Ellensburg *Capital*: Articles of incorporation of the Blue Jacket Consolidated Gold Mining Company have been filed. The mine, which is a free-milling proposition—decomposed quartz—is at Nelson's Siding. Two well-defined ledges have been discovered, one showing a width of 7 feet and the other 9 feet. It is expected to erect a mill shortly.

Spokesman-Review: The Young America mine, near Bossburg, will soon be in active operation again. The property gained an excellent local reputation a few years ago, and a large amount of ore, valued at $60,000, was marketed. When the decline in silver and lead came, work was suspended.

BRITISH COLUMBIA.

Nelson *Tribune*: The following are returns of shipments of bullion, matte and ore from the mines and smelters in southern Kootenay since last week's report:

BULLION AND MATTE.

	Pounds.	Customs Value.
Trail smelter	570,167	.....
Hall Mines smelter, Nelson, matte	77,480	.....

ORE.

	Tons.	Approximate Value.
Payne mine, Slocan	202	.....
Reco mine, Slocan	58	.....
Wellington mine	15	.....
Last Chance mine, Slocan	34	.....
Goodenough mine, Slocan	17	.....
Rambler mine, Slocan	17	.....
No. 1, Ainsworth	16	.....
Slocan Star mine, Sandon	80	.....
Idaho mine, Slocan	20	.....
Ruth	60	.....
Whitewater mine, Slocan	30	.....
Total for week	949	$169,676
Total so far for 1896	29,514	$3,416,628

Spokesman-Review: The shipments for 1896 from Rossland were as follows:

Mines.	*Lbs of Ore.*
Le Roi	55,331,900
War Eagle	18,019,191
Iron Mask	1,408,260
Josie	1,148,000
Poorman	678,900
Crown Point	300,000
Mayflower	200,000
Cliff	150,000
Evening Star	54,000
Total	77,290,751
In tons	38,645

There may have been other shipments made from Rossland, but this is all that could be obtained. Calling it 40,000 tons in round numbers, it is a remarkable showing for so young a camp. It is impossible to obtain the data as to the average value of the ore from any one mine in order to fix the value of the product of the district.

The Hall mines smelter, at Nelson, has treated 30,000 tons of ore and produced 2350 tons of matte. According to the best reports, the Trail smelter has produced 3055 tons of matte. There have been shipped from the camp at Ainsworth 1164 tons of ore. The Pilot Bay smelter has not been in operation for several months, but for the time it was in operation it produced this year 1012 tons of lead bullion.

The Kaslo-Slocan country stands next to the Cœur d'Alene in the point of value of its production. From the best sources it is learned that the district has shipped 28,245 tons of ore during the year, divided as follows: Slocan Star, 7500 tons; Payne, 2500; Washington, 1400; Ruth, 1120; Noble Five, 1000; Iron Hand, 750; Slocan Boy, 600; Reco, 600; Wonderful, 400; Last Chance, 350; Lucky Jim, 280; Monitor, 225; Enterprise, 200; Whitewater, 200; Rambler, 150; Goodenough, 150; Surprise, 120; Northern Belle No. 2, 100; Mountain Chief, 100; Ivanhoe, 100; Black Fox,

60; Northern Belle, 45; Antoine, 15; Wellington, 75; London, 15; Chambers, 15; Nepawa, 20; American Boy, 45; Ajax, 30; Carnation Read, 15; Bluebird, 15. Total, 28,245 tons.

A few other mines have shipped various small amounts. The number of mines in the Slocan from which ore has been shipped during the year is something over forty.

Rossland *Miner*: On Dec. 1 the townsite of Salmo was an unpeopled landscape. Since that time two hotels and two stores have been completed and occupied; a third will be completed in ten days, and contracts have been made for twelve new buildings to be finished within ninety days. A sawmill will be in operation in thirty days. Nearly 2000 claims have been recorded upon the Salmon river and its tributaries within a radius of six or eight miles of Salmo.

Work has been started on the long tunnel to be run through the Gopher and the Homestake, to make connection with the working shaft of the Homestake. This follows close upon the purchase of the Homestake property by D. M. Linnard and associates. The R. E. Lee, Maid of Erin, Gopher and Homestake are to be worked together under one management. The new tunnel will run 800 feet on the Gopher and 400 feet on the Homestake.

Spokane *Chronicle*: The owners of the Slocan and Center Star mines at Rossland have determined to build a smelter.

G. B. McDermott has sold the Flying Dutchman mineral claim in the McMurdo basin to Rossland parties for $15,000.

Both the mine and mill of the Slocan Star are running full blast, handling in the neighborhood of 200 tons of ore a day.

Work is being pushed on the mine and mill of the Noble Five, and it is thought that by the middle of next month the new 120-ton concentrator will be completed and ready for work.

The Globe Mining Company has received news from Kaslo stating that a new 3-foot galena ledge has been discovered on the Victoria, one of the claims owned by the company.

At Fairview the Joe Dandy, which is under a bond to eastern Canadian parties for $60,000, is being worked by twenty men. A 10-stamp mill has been ordered, which will be in running order early in the spring.

The Stemwinder will be worked by twenty men after the first of the year.

The Buck Horn and the Occidental have both been bonded for $5000, 10 per cent down.

Rossland *Mining Review*: The Great Hopes claim at Deadwood, Boundary creek, has been sold for $12,000.

War Eagle workings are now 320 feet below the surface, and the ore being taken out is the richest yet found in the mine.

UTAH.

Salt Lake *Tribune*: During the year 1896 there was shipped out of the State base metal, bullion, ores, matte and concentrates as follows:

	Pounds.	*Tons.*
Silver-lead bullion	43,395,733	21,697.1733
Silver-lead ores	115,170,760	57,585.0760
Copper matte	3,690,040	1,845 0048
Copper bullion	717,228	358.1228
Copper ore	199 400	99.1400
Copper buttons	35,335	17.1335
Carbonates	27,676	13.1676
Totals	163,236,180	81,618.0180

This is in excess over that of 1895 of 2538 tons. To carry this great mass of metal out of the State required the use of about 4552 cars.

The production of ores in Utah in 1896 was quite large. The low-grade ores concentrated cannot be given as to amount crushed, and hence only the concentrates are embraced in the table following in this article. If the crude ore was counted instead of the concentrates, it would increase our figures quite materially in some districts:

Tintic—	*Tons.*	*Tons.*
Milled	155,500	
Shipped	98,085	253,585
Mercur—		
Milled	132,000	132,000
Park City—		
Milled	49,612	
Shipped	33,153	82,765
Bingham—		
Shipped	46,016	46,016
Horn Silver—		
Shipped	10,041	10,041
Ophir—		
Shipped	5,379	5,379
Silver Reef—		
Milled	2,500	2,500
Little Cottonwood—		
Shipped	1,300	1,300
Fish Springs—		
Shipped	1,315	1,315
Stockton—		
Shipped	1,000	1,000
American Fork—		
Shipped	1,000	1,000
Totals	536,901	536,901

Marysvale, State Line and some small districts produced a little of each, but the quantity was so small that the aggregate would change these figures but little.

At the West Dip in Mercur district H. A. Coben for Capt. J. R. DeLamar will begin the sinking of shafts at a number of points to determine the value of the new locations.

The Mono is to resume work under the direction of Cisborn and Driver, the latter having bid it in at Sheriff's sale.

The Ajax has started up again with fifty men and the exploration of lower levels will be resumed. Since the shutting down of the property on Christmas eve the machinery has been overhauled. The Ajax has yet explored little more than its upper levels, and although the gross output of the mine last year reached $250,000, it was procured from drifts above the 400-foot level.

The Uncle Sam mine at Tintic has been purchased by Jesse Knight for $25,000. He intends to sink as rapidly as possible.

Mercur *Mercury*: Castleman and Hunt have sold the Sego Lily to Andrews and Wallace for $4200. A company has been incorporated and men put to work.

The Geyser people have uncovered a new body of ore on the West Geyser and are getting ready to connect it with the mill by a tramway.

Dignowity is arranging to put a new drilling apparatus, with a gasoline engine at work on his property near the Mercur mill, and a similar outfit on the Black Horse group in the West Dip.

The rush to the West Dip has been unprecedented this week. The South Daisy got down through the wash into the vein, and is now securing values. Capt. De La Mar has secured an option of a few days on the Daisy and South Daisy for $70,000. There are hundreds of men on the dip, prospecting, locating, bonding and buying, and their number is increasing.

The Golden Gate at Mercur have ore still in their shaft at a depth of 480 feet and they estimate having 400,000 tons of $14 ore blocked out. They have 2500 feet of drift southeastward and find ore from 40 to 60 feet in thickness in places.

Eureka *Democrat*: Jesse Knight of the Humbug has purchased the Uncle Sam, adjoining the Godiva, for $25,000 in cash. Active work of developing the claim will begin at once.

J. McChrystal has bought the Rising Sun mine, north of the Gemini group, for $20,000. Active work will be commenced on developing at once.

During the past few months scores of cars of machinery have been received by the various mines in Tintic district.

Bingham *Bulletin*: The Old Jordan and Galena mill is started again and will work in a single shift 100 tons of ore daily.

The ore to be concentrated is iron from the Old Jordan vein, of which there are now about 4000 tons on the dump; but a force is being put on in the mine, which Manager Holden states will be gradually increased to 75 or 100 men if future conditions are favorable.

Thirty-five leasers are now at work in the South Galena mine, and the shipments of first-class ore for January promise to be considerable.

A contract has been let at the Frisco to sink the shaft 100 feet.

Mammoth *Record*: A rich strike has been made in the Mammoth, assays showing 227 ounces in gold.

Men will soon be put on at the Lady Washington, on the vein adjoining the Sunbeam at Silver.

The vein in the bottom of the Sunbeam shaft has widened out to 10 feet, but the ore is hardly rich enough for shipment.

IDAHO.

(Special Correspondence).—Recent development work in Florence now assures the certainty of the permanence of the gold-bearing veins of this camp.

The Ozark.—This mine is running with a big force of men doing development work, and also a crew of men on the mill, getting it in shape for crushing. The work is under the management of M. A. Walker. This property is one of the best in Florence, but owing to mismanagement the former owners lost very heavily. The mill on this property was made by the Risdon Iron Works of San Francisco. The ore on the Ozark is low grade, but there is a big body of it in sight.

Blossom.—Recent work on this property in the shaft has exposed a body of ore which will run well.

Free Coinage. — This property has now passed into the list of producing mines, a vein of ore 5 feet in width and running from $20 to $50 per ton having been exposed. The ore is free milling gold.

Tip Top.—This property has been incorporated under the name of the Tip Top Mining Company. Recently a contract was let to drive a tunnel 250 feet to open the vein at a depth of 125 feet. The ledge as exposed by superficial workings is 8 feet wide and assays $20 in gold and forty ounces silver per ton, and it is free milling. H. Hamlin is manager.

Banner.—This property is showing up well, another ore chute having been recently exposed in the drift.

Gold Bug.—A body of high-grade ore has been opened on this mine. It is 20 inches wide and assays $100 per ton.

A considerable number of transfers of mining property are being recorded in this district, but no sales of any size.

The immense tunnel project being organized for the purpose of developing and draining the camp of Florence will go through. It will mean work for hundreds, perhaps thousands, of men. The plant will be of the most modern design. The capitalization of the company will be $25,000,000, $1,000,000 of which will be preferred stock carrying 6 per cent interest, payable semi-annually.

Florence, Idaho, Dec. 30, '96.

Spokesman-Review: At Burke the Standard is preparing to put out all the ore the mill can handle. Thus far the drilling has all been done by hand, but machines will be used hereafter. Electric lights are now being put in the tunnel. The daily output is between 150 and 200 tons, but enough ground is now opened up to double the output.

Silver City *Avalanche*: The past year was spent at development work on the Poorman property, and the lower tunnel, Belle Peck, has now a length of nearly 4000 feet.

At the Flint mill four Frue vanners have been added. It is thought that more concentrators will be put in and the other ten stamps started.

It is expected that the Cumberland property will be sold within a few days to a Chicago syndicate for about $30,000.

Superintendent Hutchinson gives the Trade Dollar's production for the year at $525,000 in round numbers. Expenses have been $200,000.

MONTANA.

In the Yakh district the Keystone mill, owned by Finch, Clark and others of Spokane, has resumed work and the force has been increased. It is the intention of the owners to enlarge the mill to twenty stamps in the spring.

A force of men will be put to work on the Jim Hill immediately after the first of the year and the claim thoroughly developed.

Mining World: One day last week there were shipped from Sand Coulee 145 carloads of coal of 25 tons each, or a total of 3625 tons. As its neighbor, Belt, is shipping an average of 130 cars a day, it will be seen that the two camps have a daily output of about 7000 tons.

J. C. Sloss of Boulder, who recently secured a bond and lease on the German Bar placers in Madison county, has secured an option on 600 acres of placer ground at the lower end of the gulch.

Western Mining World: The output of the principal mining companies of Butte for the year 1896 is summed up as follows:

Anaconda Copper Mining Company, 107,035,697 pounds of copper; 5,308,956 ounces of silver and 18,300 ounces of gold.

Boston & Montana Company, copper (estimated), 45,000,000 pounds.

The Montana Ore Purchasing Company had a prosperous year, and the production was considered a good one. During the year the company produced 17,083,019 pounds of copper; 619,978 ounces of silver and 24,640 ounces of gold.

The Parrot Company produced during the year about 14,000,000 pounds of copper as well as considerable gold and silver.

The Colorado Company produced during the year not less than 5,000,000 pounds of copper and a large number of ounces of gold and silver.

The Butte Reduction Works estimated output for the year is about 4,000,000 pounds of copper and some gold and silver.

WYOMING.

At Grand Encampment since the middle of September, when the discoveries first became known, a great many people have visited the section, and it is estimated that at the present time there are some 200 miners doing assessment work.

The gulches are very deep and the mountains steep, so that tunnels may be run and strike the ore bodies at depths varying from 600 to 1100 feet. There is in the district sufficient wood and water for all practical purposes. The mineral belt is about 4½ miles wide.

In addition to the lode claims considerable placer ground has been located along the several streams and gulches running through the belt.

SOUTH DAKOTA.

Black Hills *Times*: A recent test run of ninety tons of ore from the Juniper mine, situated near Keystone, resulted in a cleanup of $700. The gold was so coarse that nearly the entire amount was found in the batteries.

A hole will be sunk from the bottom of the Union Hill shaft, now 300 feet deep, to the 500-foot level and the material passed through tested. The shaft is all in ore of good grade and perfectly dry. The bore will determine where water level is and the extent of the ore body.

COLORADO.

(Special Correspondence).—Shipments of ore from Idaho Springs by the three sampling companies having works here were as follows for the year 1896.

	Tons.
State Ore Sampling Co	5,120
W. J. Chamberlain Co	5,400
Dewey Bros	5,000
Total	15,520

Statements from Dewey Bros. show that the ores they handled ran as follows to the ton, viz: gold, 1½ ounces; silver 38 1-5 ounces; and 7 per cent lead, which makes a high valuation for an average. W. J. Chamberlain company's bulk averaged about $37 per ton in values. That of the State Ore Sampling Co. ran about the same as the others. The above shipments all went to the smelters at Denver and Pueblo. This does not constitute all the ore shipments from the district, by any means, as that sent out from individual sources amounts to a large item, though it is difficult to get at definite figures.

The numerous stamp mills and concentrators probably handle about half the ores of the district. The mineral output of Clear Creek county, it is estimated, will reach approximately $3,000,000 for 1896

The ores of the county are of a generally refractory nature and much of the mill work is primarily to save the concentrates.

The Silver Age concentrating mill is closed down, John G. Roberts, who has had it leased, having given it over to the owners, and is remodeling the old Freeland mill.

The Mixell stamp mill is operating with its fifteen stamps. Recently a test on this mill showed the following: 21,360 pounds of ore were crushed, sampled and assayed, showing a bullion value of $129—$77 in gold and $52 in silver. The results of milling gave in gold and concentrates, $121.32—$72.20 in gold and $49.12 in silver. Mr. Mixell uses the slow-drop stamps.

The Lamartine mine, up Chicago gulch, is steadily operating with a force of about 100 men and producing a high grade smelting ore.

The one thing favorable to Clear Creek county is the abundance of water for all kinds of milling purposes and power. Practically all the mills of the district are operated by water power, as is also the machinery of most of the big mines.

Work on the Newman tunnel is progressing, the present workings being in over two miles.

'WASCOTT.

Idaho Springs, Col., Dec. 31st, '96.

(Special Correspondence).—In Gilpin county the Gold Coin Mines Company own and operate the Indiana and Kansas groups above Nevadaville, and operate the Hidden Treasure, in the same locality, under lease from the California Company. These properties output both smelting and milling ores.

The Vendome Company, which bought out the Hubert properties on Prize hill and vicinity, produced $127,000 in values within the year. Of this about $71,000 resulted from smelting ores and the balance from mill dirt. They have a very large territory of mineral ground, and their developments are extensive. One of their properties, the Hubert, is over 1100 feet deep and has paid $300,000 in dividends.

A characteristic of the Nevadaville section of the district is a granite and gneiss as country rock, with a vein filling of porphyritic lime, having an iron and copper base.

The Gregory-Bobtail, which has been under bond and lease to Clinton, Reed & Co. of Denver, it is reported, will change hands soon. The Bobtail tunnel, or incline, is in over one mile, and was put in almost solely for development purposes.

The Sleepy Hollow, Fisk, Ophir-Burroughs, Belmont, Old Colony, First Centennial and Alps are being worked largely by tributers. While each property makes its own regulations and exacts a royalty which depends upon grade of ore blocked out to each tributer, the system works well here under well recognized general rules. Where regular leases are taken on properties for terms of three to five years, the royalty is usually 10 per cent on milling ore and 15 per cent on smelting ore. The fact that such a very large number of men are employed in connection with the leasing system in some way or another, has always been a factor in the easy settlement of all labor troubles of this district.

The motor tramway, which has nearly forty miles of track, reaches practically all the mining centers of the district and greatly facilitates the milling and shipment of ore.

Estimates at this time place the mineral output of Gilpin county, in round numbers, at $3,000,000, which is principally gold.

Central City, Dec. 31st, '96. WASCOTT.

Denver *Republican*: The deed has been recorded transferring a one-fifth interest in the Strong mine of Cripple Creek from the American National Bank of Denver to E. W. Giddings of Denver. The price paid was $45,000, which would make the property worth $225,000.

The Portland has at last got the flow of water encountered last week under control, but it came within a few feet of flooding not only the seventh but the sixth level as well.

A bond in the sum of $55,000 has been taken on the E. T. C., on Galena hill, by M. S. Rupp. The lessee is required to do thirty-five shifts a month, and has until February, 1898, to complete the purchase of the property.

The Anglo-Colorado Exploration syndicate is getting good ore from the new shaft on the Rigi, on Battle mountain, and in the past week has made two shipments, one of milling ore averaging $30 a ton and the other lot a good high-grade, going above $100.

At Aspen the strike recently made in the Alta Argent mine in this city, on the blocks under lease to the Copeland syndicate, is holding splendidly and ore of the average value of fifty ounces is being shipped regularly.

This week saw the completion of the sinking of the Free Silver shaft to the 1200-foot level and the conclusion of a piece of mining work of considerable magnitude. This gives the Free Silver the deepest workings in the district.

NEW MEXICO.

Silver City *Enterprise*: At Pinos Altos sixteen men are employed in the stopes of the Mountain Key on the first, second and third levels. The ore extracted is reduced in the Chilian mill on the mine, with good results in gold. The force of miners will soon be increased. The mine will be pumped out below the 300-foot level.

The Treasure Mining Company, composed of Denver capitalists, has developed a paying property out of the Atlantic mine. The 10-stamp mill crushes about twenty tons of ore per day.

The Golden Giant is working thirty-five men in the mine and mill. The main shaft has attained a depth of 78 feet below the 350-foot level; 22 feet yet to sink to where the 450-foot level will be started.

Santa Fe *New Mexican*: At Hopewell district, in Rio Arriba county, on the Revenue claim they are in 226 feet on the tunnel and have cut three veins, one running $17.

The Iron Mountain Company is in 150 feet on its tunnel in Iron mountain and has cut a 5-foot vein that assays $15.

The Altamont tunnel is in 401 feet.

The tunnel being run by Nebraska parties on the Good Hope is in 275 feet.

J. P. Renker has the tunnel on the Sidney in 100 feet.

H. H. R. Brownell has organized a company —capital stock, $300,000—on the Exchange claim, with Wright of Denver, Wyant, Brownell, Victory and Pope, of Santa Fe, directors.

ARIZONA.

Tucson *Star*: At Oro Blanco the Oro mill with ten stamps is crushing twenty tons each twenty-four hours. Twenty-five men are employed in the mill and mine.

The Old Glory mill has closed down. It has ore-crushing capacity for only twenty stamps and is adding enough ore crushers to supply the thirty stamps of the mill.

The Tres Amigos mill, with a fifteen-ton capacity, is running steadily on free gold ore with good results.

Jerome *Mining News*: W. A. Clark will put a force of men at work developing copper mines near Tucson.

Silver Belt: At the Continental copper mines, at Globe, work of development has been commenced.

Work will be started immediately on the Pinto Creek Mining and Smelting Company's properties on Pinto creek. The ledge is large and the ore is rich in copper and carries considerable gold.

H. Klaustermeyer has let a contract to further develop the Cleveland mine. The ore is a lead carbonate, carrying 40 ounces of silver to the ton.

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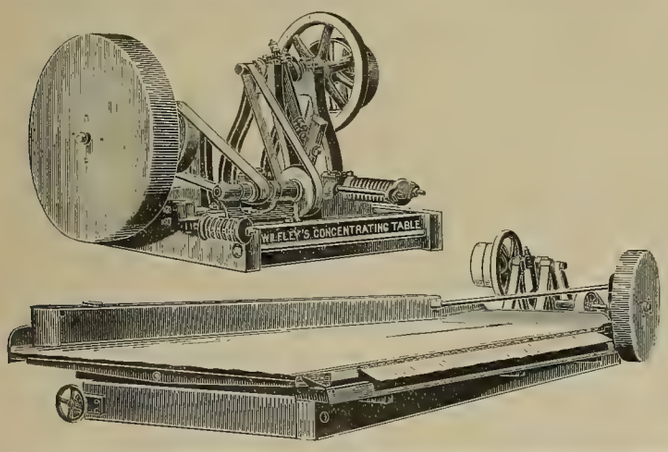
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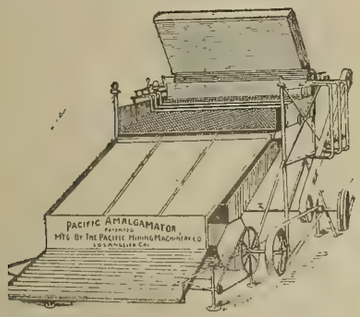
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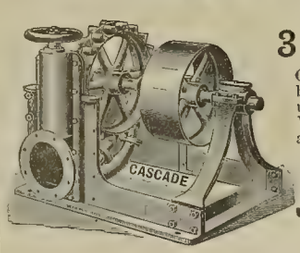
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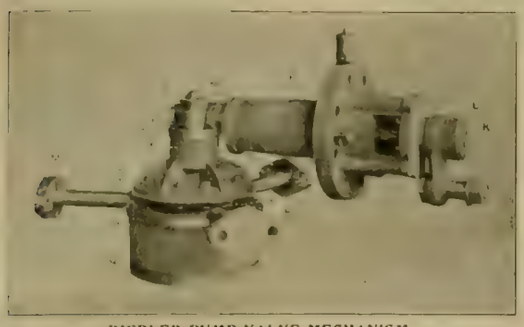
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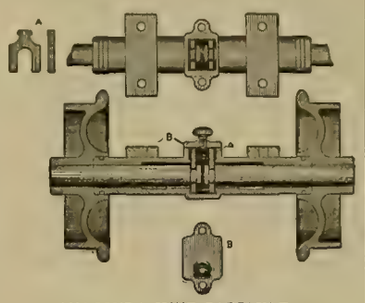
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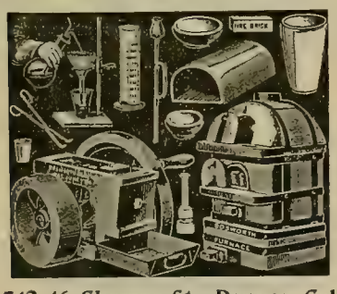
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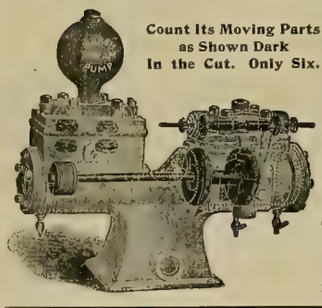
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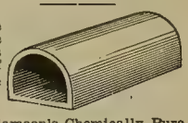
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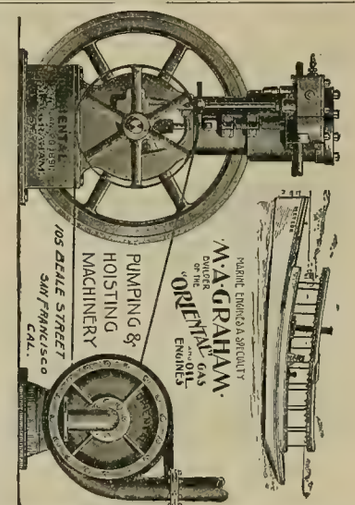
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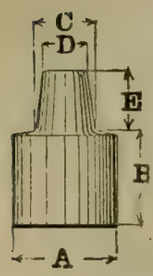
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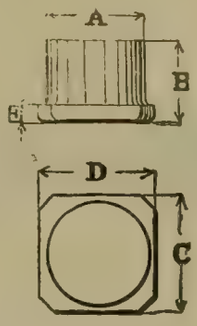
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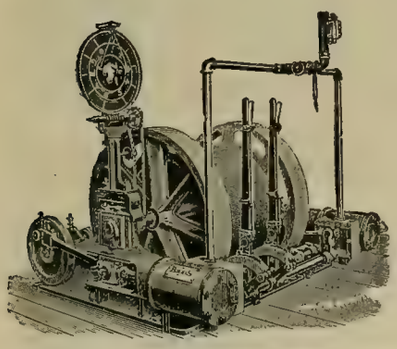
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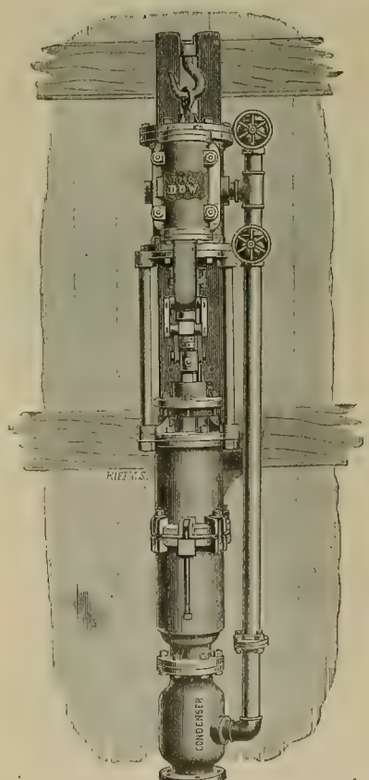
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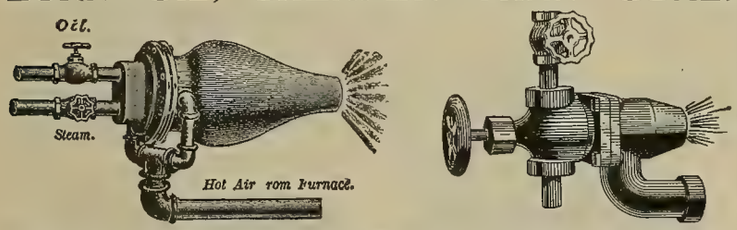
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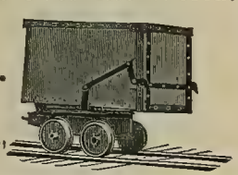


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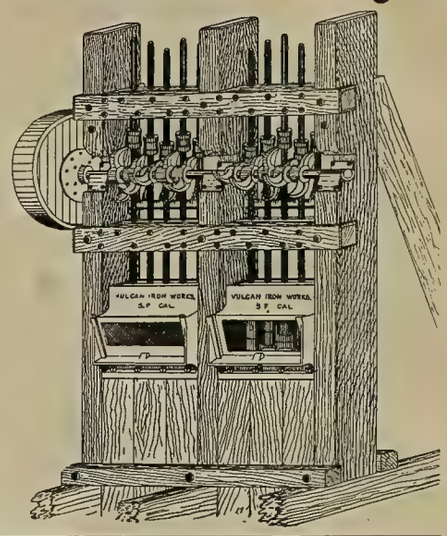
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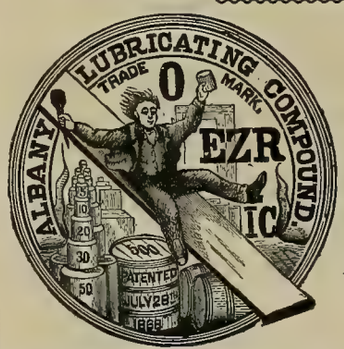
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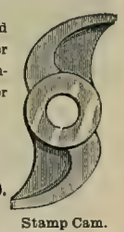
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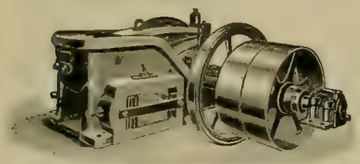
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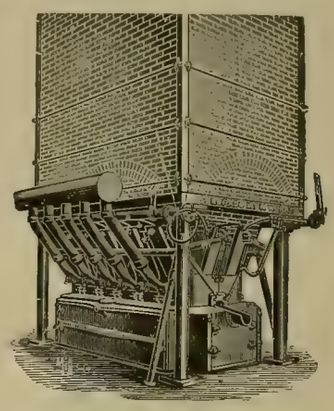
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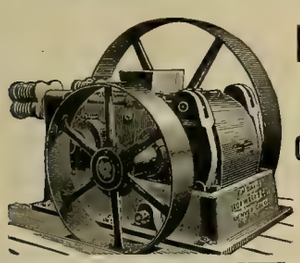
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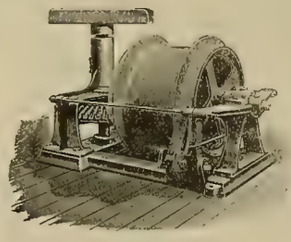
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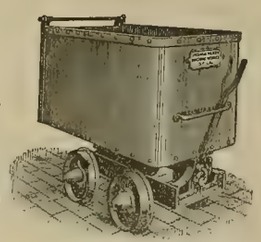
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Market Reports.

The Markets.

SAN FRANCISCO, Jan. 7, 1897.

Trade has not recovered from mid-holiday dullness, but merchants, manufacturers and business men in general are quite confident that a revival will set in before the close of the current month. There is not only a feeling that general trade will begin to revive, but it will increase in volume as the spring months draw near. The consensus of opinion is that retail distributors in all parts of the coast are carrying light stocks which will require not only filling in, but an increase carried in almost all lines owing to all information pointing to an enlarged consumptive demand. From those in position to know the opinion prevails that manufacturers, particularly those engaged in machinery and structural material, will enjoy an exceptionally good business. Tariff legislation continues a disturbing factor and until this is well out of the way it will show more or less influence on the general situation.

In the local money market disbursements usual in this month are being made. As these will aggregate several million dollars on this coast, they will tend to further ease in the markets, as the funds begin to seek the usu l reservoirs for investments. Bank failures at the East have no perceptible influence here, as the institutions that have suspended are said not to have been conducted on well established conservative banking lines, besides the conditions which brought disaster to them are with the past and have no bearing on the future. The East reports continued ease at Atlantic seaboard financial centers, which will be made still more easier as the heavy disbursements go into general circulation. There are fears that gold exporting will be commenced soon; but this, even if it is done, ought to be on a limited scale, by reason of Europe not unloading American securities on us, besides which our exports of products are in excess of the imports. European advices indicate that there is a tendency to more ease at the financial centers, notwithstanding Germany is absorbing gold.

New York Silver Prices.

NEW YORK, Jan. 7.—Following are the closing prices for the week:

	Silver in— London.	N. Y.
*Friday	29 13-16	64⅞
Saturday	29 13-16	64⅞
Monday	29¾	64¾
Tuesday	29¾	64¾
Wednesday	29¾	64¾
Thursday	29 11-16	64⅝

*Holiday.

	Copper.	Lead.	Iron.	Tin.
*Friday	.....	.....	.....	.....
Saturday	11 45	3 05	11 00@13 00	13 00
Monday	11 45	3 05	11 00@13 00	13 05
Tuesday	11 50	3 05	11 00@13 00	13 10
Wednesday	11 45	3 02½	11 00@13 00	13 05

*Holiday.

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	12½c Prem
New York Telegraphic Transfer	15c Prem
London Bankers' 60 days	$4.84½
London Merchants	$4.84
London Sight Bankers	$4.88
Rebned Silver, per oz., 1000 fine	64¾
Mexican Dollars	51½@52½

SILVER.—In sympathy with London the markets at the East and on this coast have weakened. The decline in London was due to the allotment of India Council bills. The India Council was forced to this owing to continued stringency in the money markets there, aggravated by the impoverishment of the mass of the people by the drouth. The opinion prevails that silver will begin to show more strength soon.

The highest and lowest monthly prices compare as follows:

1896—	New York (cts.) High.	Low.	London (pence.) High.	Low.
January	67½	66¾	30⅞	30½
February	68⅞	67¾	31 9-16	30¾
March	68⅞	68	31 9-16	31⅛
April	68¾	67⅞	31 3-16	30 13-16
May	68⅝	67⅝	31¼	30 15-16
June	69⅛	68¼	31 9-16	31 3-16
July	68⅞	68½	31½	31⅜
August	69⅝	65¾	31⅜	30⅜
September	66⅝	64¾	30 11-16	30
October	65¾	64⅜	30 5-16	29¾
November	65¼	64½	30 3-16	29¾
December	65⅝	64⅞	30	29 13-16
Highest	69⅛	....	31 9-16	.....
Lowest	....	64⅜	.....	29¾

In December, 1895, the highest London price was 30 11-16d and the lowest was 30d. The highest New York price was 67⅛c and the lowest 65⅝.

MEXICAN DOLLARS.—The market is quiet but prices have not gone off so much as had been looked for. New York quotations come through at 51¼ to 52 cents according to quantity and quality.

ANTIMONY.—Our market is quoted at 7½@8c in a jobbing way. New York mail advices quote 7¼c for Cookson's, 6¾@6¾c for Hallett's and 6½c for Japanese.

QUICKSILVER.—The market is practically unchanged. Receipts for the year ending with December 31, compare as follows in flasks: 1896, 25,558; 1895, 32,747; 1894, 28,080. The exports compare as follows: 1896, 26,995; 1895, 30,401; 1894, 31,988.

The market is quoted as follows:

Domestic trade, per flask 36 40

For export, quotations are nominal but less than for home.

COPPER. — The market shows more strength. The East reports a good export and domestic demand for the season of the year. There seems to be more disposition to buy for future delivery when asking prices are not considered too high.

Ingot, jobbing	14¼@—
Ingot, wholesale	13¾@—
Sheet copper	17 @—
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17c
Lake Superior Sheathing	20

LEAD.—The market has ruled slightly firmer at the East, in which ours sympathized. This is doubtless due to smaller supplies and expected favorable tariff legislation.

Pig	— @ 3 75
Bar	— @ 4 00
Sheet	— @ 5 25
Pipe	— @ 4 50

SHOT.—There is a good seasonable demand.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 20
Drop, B and larger sizes, " "	1 45
Buck, Balls and Chilled, do, " "	1 45

BORAX.—The market is steady at current quotations. The export movement last year was largely in excess of both 1895 and 1894.

The market is quoted as follows:

Refined, in car lots	5
Refined, in sacks	4¾
Powdered, in car lots	4½
Concentrated, "	5

TIN.—There is more inquiry, but no change in quotations, although the East reports slightly higher prices for pig. Imports of plate are fair.

Pig, per lb	14¼c@—
Plate, I C coke, heavy, per box	— @$4 05
" " " light, "	— @ 3 95

IRON.—The market seems to be more or less in an uncertain position, owing to reported closer competition at the East. It looks as if, in the Central States, lower prices for steel rails will have to rule, owing to conclusion of negotiations between the Carnegie Steel Company and the Rockefeller interests, by which the Steel Company acquires control of the best ore properties on the Mesaba range from the Rockefellers. The agreement provides for the shipment of the ore in the Rockefeller steamers to Conneaut, where it will be turned over to the new Pittsburg, Bessemer & Lake Erie Railroad, controlled by the Carnegie Company. This will have a very material bearing on iron ore, which must also go off in values, as the larger interests will try and crush out the smaller.

We quote as follows:

AMERICAN.

	To Arrive.	Spot.
Sloss	$21 00	$23 50
Thomas	22 00	23 50
Salisbury	30 00	33 00

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

LUMBER.—There is nothing new to report.

Redwood, Fluming	17 00	@	— —
Pine	14 00	@	19 00
Spruce	26 00	@	31 00

COAL.—The general situation is practically unchanged. The tone of the market is firm with the tendency to higher prices for cargoes in all positions.

SPOT FROM YARD—PER TON.

Wellington	$7 50	@	8 00
Greta	6 00	@	6 50
Nanaimo	6 50	@	7 00
Gilman	5 50	@	6 00
Seattle	5 50	@	6 00
Coos Bay	—	@	5 00
Cannel	—	@	8 00
Egg, hard	12 00	@	13 00
Wallsend	—	@	6 50

TO ARRIVE—CARGO LOTS.

Australian	5 50		
Liverpool Steam	6 25		
Scotch Splint	—		
Cardiff	6 25		
Lehigh Lump	9 00		
Cumberland	13 00		
Egg, hard	10 00		
West Hartley	6 50		

COKE.—The market is quoted as follows:

Gas Companies'	—	—	— —
English, to load	9 00	@	— —
" spot, in bulk	9 00	@	10 00
" in sacks	11 00	@	12 00
Cumberland	—	@	— —

POWDER.—The demand is fair.

The market is quoted as follows:

Hercules, No. 1*, per pound	11½c
" No. 2, " "	8½c

Mining Share Market.

SAN FRANCISCO, Jan. 7, 1897.

The market has been more active the past week, with trading confined largely to the Gold Hill shares under the lead of Challenge, Confidence and Belcher. The improvement in the market is said to be due to confirmed reports that the west crossdrift in Alpha had struck the red, or west lode, which, reports state, is largely gold-bearing quartz. From all that can be learned, it is safe to affirm that the management will not uncover high-grade ore, but it may prove of sufficient value and width to cause the shares to command quite an advance on present prices. As Alpha lies between Exchequer and Con. Imperial, which latter adjoins Challenge, the shares of these two mines ought to sympathize. The work hat is being done in Confidence and Challenge, although the latter is not reported, is said to be also on the west lode; but care seems to be taken not to develop enough ore to cause outside buying. The activity in Belcher is largely due to a contest for control by A. Krause and associates. It is stated that the contestants are having the books of the company overhauled; that the official letters from this mine have not, for many months at least, been satisfactory—not conforming to the requirement of the law under which the company was incorporated. There are those who believe that much better reports could have been made, and also considerable more ore taken out and the mine made to pay. The shares of the middle and north end mines strengthened slightly in sympathy with the move in the Gold Hill mining shares. The Standard shares are now called regularly, as Bodie, Mono and Belcher have been consolidated with it. They do not, as yet, attract much attention, but probably will if they sell higher and dividends become a reality, and not a promise.

The following companies had cash on hand January 1: Andes, $3535, Alta, $1161, Alpha Con., $4429, Belcher, $5000, Bullion, $2172, Best & Belcher, $2440, Caledonia, $3357, Con. New York, $630, Challenge Con., $2634, Chollar, $357, Con. Imperial, $1000, Confidence, $3582, Con. Cal. & Va., $4945, Exchequer, $1603, Gould & Curry, $1235 (with $2500 owing to the Nevada Bank), Justice, $374, Mexican, $10,075, Overman, $8214, Ophir, $6082, Occidental Con., $4373 (with $2500 due the bank), Potosi, $9068, Savage, $292, Seg. Beicher, $2805, Syndicate, $586, Sierra Nevada, $9595, Standard Con., $42,050, Union Con., $10,980, Utah Con., $1489.

The following companies report an indebtedness: Crown Point, $2004, Hale & Norcross, $19,995, with monthly expenses to be paid, and $26,547 to be collected on the pending assessment, Lady Washington, $866, Silver King, $2084.

From the Comstock mines official letters are largely made up of the number of feet run from points which would puzzle even experienced miners to find with any degree of correctness. In Utah they are running a south drift, passing through low-grade quartz. In Sierra Nevada they are driving a west crossdrift on the Layton tunnel level. They make about 13 feet a week. In Union they are running on the 900-foot level a north lateral drift and another from an upraise above this level. About 50 feet from the Ophir line Mexican is driving a west crossdrift on the 1000-foot level. The material reported in last letter was porphyry and clay seams. In Ophir active exploiting work is being done on the Central tunnel level. On the 1000-foot level repairs have been completed and work resumed. The work in Con. Virginia is confined to the 1000-foot, 1650-foot and 1750-foot levels. The official letter is not of an encouraging character, although there is no telling what may come any day from the work that is being done. No ore is being extracted. They are exploiting the 900-foot level of Hale & Norcross. No ore was extracted last week. The monthly statement filed of expenses and income for December is a model that other secretaries might follow with credit. This statement shows that the mine is well and economically managed. In Savage the usual work is being done. From Potosi and Chollar we are without advices as to the work, if any, that is being done. In Bullion work has been resumed on the north drift. No work is being done by Exchequer. Work to the west is still the order in Alpha. North and south lateral drifts will, it is reported, be run along the ledge struck last week. Work is being done to the west in Con. Imperial. One crossdrift is being run by that company and another jointly with Challenge and Confidence. No change is reported in Confidence work. A few tons of ore is raised each week. Belcher and Seg. Belcher continue to raise a few tons of ore, but from what level and as to the work that is being done the official letter is silent. A few tons of ore is raised each week by Overman. No change is reported in the work in Alta.

The movement in the shares of the Comstock mines is drawing attention from the Brunswick lode. In Occidental they are sinking on the ledge cut on the 550-foot level. They are running a southeast drift on the 750-foot level. In Chollar they are running two new crossdrifts south of the two first run on the 400-foot level. They sent to the mill over 100 tons of ore assaying over $70 a ton, with the silver calculated at par. The work at other points in the mine is practically unchanged. In Savage no change is reported in the work. In both Gould & Curry and Best & Belcher they are working on the 300-foot and tunnel levels. Nothing of an encouraging character is reported in the official letters.

From the Bodie district the official letter regarding work in Standard is of a very encouraging character.

The following illustrates the changes of the week:

Mines.	Dec. 30.	Jan. 7.
Alpha	.....	$ 17
Alta Consolidated	.....	04
Andes	.....	16
Belcher	$ 48	51
Best & Belcher	55	54
Bodie	62	.....
Bullion	.....	07
Challenge	35	64
Chollar	81	76
Confidence	85	1 45
Consolidated California and Virginia	1 10	1 05
Consolidated New York	.....	.....
Crown Point	21	28
Exchequer	.....	.....
Gould & Curry	.....	27
Hale & Norcross	1 10	.....
Justice	.....	.....
Mexican	41	45
Ophir	94	1 00
Overman	17	.....
Potosi	54	55
Savage	26	27
Sierra Nevada	.....	47
Union	40	44
Utah	.....	04
Yellow Jacket	31	40

San Francisco Stock Board Sales.

SAN FRANCISCO, January 7, 1897.

9:30 A. M. SESSION.

100 Alpha	16	100 Mexican	45
700 Alta	04	400 Occidental	20
350 Belcher	51	1250 Ophir	1 00
600 Best & Belcher	50	1100 Savage	25
100 Challenge	61	200 Seg Belcher	11
100 Chollar	75	100 Standard	1 40
500 Con Imperial	02	50 Union	44
500 Gould & Curry	27		

SECOND SESSION—2:30 P. M.

500 Ophir	98	300 Sierra Nevada	47
200 Mexican	44	300 Bullion	07
300 Gould & Curry	27	200 Justice	06
200 Best & Belcher	54	400 Utah	04
800 Con Cal & Va	1 05	400 Alta	04
600 Potosi	55	800 Challenge	64
450 Crown Point	28	600 Occidental	21
400 Yellow Jacket	40	350 Andes	16
600 Kentuck	04	100 Syndicate	03
200 Alpha	17	300 N. G. & C	23
200 Chollar	76	500 Union	44
400 Belcher	53	100 Savage	27
200 Confidence	1 45		

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.	Secretary.
Alta S M Co, Nev	54	5c	Dec 14	Jan 18..Feb 8	J E Jacobus, 309 Montgomery
Anita G M Co, Cal	12	5c	Dec 21	Feb 1..Feb 18	L F Reichling, 404 Montgomery
Bullion Con G M Co, Cal	10	10c	Nov 30	Jan 11..Feb 10	C A Grow, Mills Bldg
Con Cal & Va M Co, Nev	7	25c	Dec 8	Jan 14..Feb 4	A W Havens, 309 Montgomery
Crown Point G & S M Co, Nev	69	10c	Dec 9	Jan 13..Feb 3	Jas Newlands, Mills Bldg
Eureka Con Drift M Co	5	5c	Nov 24	Dec 28..Jan 18	D M Kent, 330 Pine
Exchequer M Co	39	5c	Nov 14	Dec 17..Jan 11	Chas E Elliott, Nevada Block
Gould & Curry S M Co, Nev	80	15c	Dec 14	Jan 19..Feb 9	A K Durbrow, 309 Montgomery
Hale&Norcross S M Co, Nev	110	25c	Dec 8	Jan 11..Feb 1	R U Collins, 331 Pine
Hartmann Mining Co, Cal	1	5c	Dec 22	Feb 1..Feb 23	G W Peer, 4 Montgomery
Horsefly G M Co	1	25c	Nov 4	Dec 21..Jan 20	R T Ward, 610 Clay
Jamison M Co	9	5c	Nov 27	Jan 25..Mar 22	Sam W Cheyney, 120 Sutter
Mineral Hill M & S Co, Cal	1	5c	Jan 4	Feb 15..Mar 25	Chas Peach, 210 Sansome
Occidental Con M Co	25	15c	Nov 24	Dec 29..Jan 18	A K Durbrow, 309 Montgomery
Overman S M Co	76	10c	Nov 28	Dec 31..Jan 22	Geo D Edwards, 414 California
Thorpe M Co, Cal	4	5c	Oct 14	Dec 22..Jan 9	A F Frey, 567 Market
Ybarra G M Co, Lower Cal	6	10c	Dec 4	Jan 6..Jan 25	Jas Coffin, 132 Market
Reward G M Co, Cal	17	3c	Dec 19	Jan 20..Feb 5	S W Backus, Mills Building

ANNUAL MEETINGS.

Company and Location.	Secretary and Office in S. F.	Date.
Brunswick Con G M Co, Cal	J Stadtfeld, 309 Montgomery	Jan 14
Bullion M Co, Nev	R R Grayson, 331 Pine	Jan 14
Silver King M Co, Nev	J W Pew, 310 Pine	Jan 12

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Recently Declared Mining Dividends.

Alice, Utah, $25,000; payable Dec. 31, 1896.

Swansea, Utah, $5000; payable Jan. 4, 1897.

The Swansea Mining Company of Utah, $5000; payable Jan. 6th.

The following dividends were paid in Utah in 1896:

Centennial Eureka (15)	$ 150,000
Silver King (11)	412,500
Bullion-Beck and Champion	200,000
Mercur (9)	225,000
Ontario (12)	180,000
Mammoth	100,000
Dalton & Lark (6)	75,000
Galena, Fish Springs	50,000
Horn Silver (1)	50,000
Daly (1)	37,500
Utah, Fish Springs	24,000
Swansea	30,000
Sacramento (3)	12,000
Geyser	10,000
South Swansea	7,500
Total	$1,913,500

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING DEC. 29, 1896.

573,847.—FURNACE DOOR—E. M. Andrus, Mitchell, Or.

574,189.—FIREARM—H. Carr, S. F.

574,340.—FIREARM—R. M. Catlin, Tuscarora, Nev.

573,963.—WATER ELEVATOR—J. M. Corn, Tempe, A. T.

573,966.—INSULATOR HANGER—R. Duncan, S. F.

574,311.—GAS ENGINE—J. W. Eisenhuth, S. F.

574,061.—PROJECTILE—G. Gustave, Los Angeles, Cal.

573,980.—RAILWAY RAIL BOND—B. Jennings, San Jose, Cal.

574,365.—BOX NAILER—H. R. Kumler, Etiwanda, Cal.

574,069.—PHOTOGRAPHS IN RELIEF—T. C. Marceau, S. F.

574,071.—WHIFFLETREE—W. A. O'Bar, Everett, Wash.

574,041.—CAR FENDER—M. Rings, Seattle, Wash.

574,075.—SYRUPING MACHINE—F. A. Robbins, S. F.

574,288.—HAIRPIN—J. W. Timmons, Callam, Wash.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail for telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

COIN-HOLDERS.—Charles A. Webster, Oakland, Cal., assignor of one-half to George B. McClelland of same place, and Milton F. Webster, Spokane, Wash. No. 573,251. Dated Dec. 15, 1896. This invention relates to a device for holding coins so that they may be conveniently extracted. It is especially designed to hold nickels and other small coins which are used for paying fares upon the cars, and for other similar purposes, so that said coins can be easily extracted singly and successively. It consists of one or more channeled sections adapted to receive coins, having springs at the upper end, between which the coins are introduced, and springs at the lower end to prevent the coins from falling out by gravitation. Openings are made in the lower end upon opposite sides of the space containing the lowermost of the coins, so that it may be grasped and removed, the springs which hold it yielding sufficiently for that purpose. The sections containing the coins are hinged together, and the device is attached by a pin or otherwise to some convenient point about the person of the user, whereby the coins are always within convenient reach.

BEER-DRAWING APPARATUS.—J. R. Young of San Jose, Cal., assignor of three-quarters to Charles M. Gardner, Louis H. Hartmann and John Shields Jr., of same place. No. 573,172. Dated Dec. 15, 1896. This invention relates to an apparatus for drawing beer, and other liquids under pressure, without permitting the escape of gas. Its special object is to draw beer directly from the keg, so that the gas will be retained, and a suitable pressure maintained to keep the beer sharp and sparkling until the keg is exhausted, while preventing the undue foaming of the beer. It consists in the combination of a pressure chamber connecting with the liquid passage from the keg, a long conical valve intervening and controlling said communication, a spring acting behind the valve in conjunction with the pressure in the chamber to automatically close the valve against the pressure upon the keg and means for relieving the valve of the spring, as the pressure in the keg decreases. An adjusting screw serves to move the washer so as to press the spring away from the valve.

ELECTRIC RAILWAY.—Anson Sprague, San Leandro, Cal. No. 573,169. Dated Dec. 15, 1896. This invention relates to improvements in electric railways. It consists essentially of a channeled insulated surface rail having a conductor fixed to it, a pivotally secured lever having a trolley to engage the conductor, a second lever by which the trolley lever is carried with an intermediate slide, whereby the trolley is moved into and out of contact with the conductor.

EJECTORS FOR MINING AND DREDGING.—William Muir, Michigan Bluff, Cal. No. 573,611. Dated Dec. 22, 1896. This invention relates to a device which is especially designed to raise water or sand, mud and gravel for mines or depressed locations, and for dredging bay and river bottoms, etc., and to eject the material at a considerable distance



above the point from which it is raised into lighters or other receptacles. In this apparatus a column of water is delivered under pressure into a supply and a discharge chamber with an intermediate suction chamber, the two having passages axially in line, a cylindrical pipe opens into the suction chamber at one end, the nozzle fits in the said pipe and is independently adjustable in the funnel-shaped sleeve in the opposite side of the chamber and longitudinally adjustable with relation to the discharge pipe.

ODORLESS CREMATORY.—C. W. Lent, Oakland, Cal., assignor to the Odorless Crematory Co., same place. No. 573,605. Dated Dec. 22, 1896. This invention relates to an apparatus for destroying garbage and other material by heat and at the same time disposing of all noxious fumes arising from the operation. It consists essentially of a furnace with suitable means for heating it, having a grated floor or hearth, with means for discharging the burnt material after destructive distillation, a chamber situated above the furnace heated therefrom and adapted to receive the garbage or material, said chamber serving to dry out the material, after which it is discharged by gravitation through suitable gates or openings into the furnace beneath, the clinkers and ashes being eventually discharged through the hearth of the furnace into ash pits, from which it may be recovered. The vapors produced in both the drying chamber and the furnace are led through discharge pipes with suitable draught apparatus, by which they are carried through a series of condensers, and any gases which will not condense are returned and pass through the furnace, where they will be finally consumed. The only discharge after passing through the condensers will be air which has passed through the furnace to supply combustion, and a small amount of odorless, watery vapor.

PROPELLER.—Frederick Wittram, San Francisco. No. 573,562. Dated Dec. 22, 1896. This invention relates to improvements to be applied to propellers for vessels and other similar purposes. It consists essentially in a novel construction of the propeller blade, having corrugations decreasing in depth transversely from the front to the rear edge of the blade, so that the valleys thus formed serve to gather and concentrate the water through which the propeller is moving and discharge it from the rear edge to the blade. This construction also greatly strengthens the propeller and enables it to resist the strains which are naturally brought upon it.

TRACTION ENGINE AND HARVESTER ATTACHMENT.—Benjamin Holt, Stockton, Cal. No. 573,593. Dated Dec. 22, 1896. The object of this invention is to provide certain improvements in traction engines and harvesters, and especially in the means for connecting the engine and the harvester with an intermediate supplemental engine, by which the harvester mechanism is driven independent of the traction engine, and by which the supplemental engine and the harvester are allowed to turn upon the coupling with relation to the traction engine without throwing the connecting driving parts out of line. This is effected by a series of swivel joints, which allow the power of the supplemental engine to be applied to driving the cutting and threshing mechanism, the steam to this engine being supplied directly from the main traction engine boiler while the traction engine itself has only to draw the machine over the ground. In conjunction with this engine there are employed supplemental removable wheels and wheel frames journaled outside of the main bearing wheels of the engine and sprocket wheels and chains by which both main and supplemental bearing wheels are driven directly from the engine, while in front of the steering wheel is a supplemental roller which serves as a bearing for the front end of the machine. The supplemental wheels and roller act particularly upon soft ground, where the weight of the engine would sink it and make it useless under ordinary circumstances.

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Assessment Notices.

CON. CALIFORNIA AND VIRGINIA MINING Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 8th day of December, 1896, an assessment (No. 7), of 25 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room No. 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on THURSDAY, the 4th day of February, 1897, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room No. 29, Nevada Block, No. 309 Montgomery street, San Francisco, California.

HALE & NORCROSS SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, State of Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 8th day of December, 1896, an assessment (No. 110) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 3, No. 331 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on MONDAY, the 11th day of January, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 1st day of February, 1897, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

R. U. COLLINS, Secretary.

Office—Room 3, Stock Exchange building, No. 331 Pine street, San Francisco, California.

GOULD & CURRY SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 14 h day of December, 1896, an assessment (No 80) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 69, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of January, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on TUESDAY, the 9th day of February, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Trustees.

ALFRED K. DURBROW, Secretary.

Office—Room 69, Nevada Block, 309 Montgomery St., San Francisco, California.

HARTMANN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Chili Gulch Mining District, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 22nd day of December, 1896, an assessment (No. 1) of 5 cents per share was levied upon the issued capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 46, No. 4 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of February, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 23d day of February, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

G. W. PEER, Secretary.

Office—Room 46, No. 4 Montgomery street, San Francisco, California.

MINERAL HILL MINING AND SMELTING CO.—Location of principal place of business, San Francisco, California; location of works, Spenceville, Nevada County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 4th day of January, 1897, an assessment (No. 1) of five cents (5c) per share was levied upon the whole of the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 210 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of February, 1897, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 25th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. PEACH, Secretary.

Office—210 Sansome street, San Francisco, California. Office hours from 1 to 3 o'clock P. M.

DIVIDEND NOTICE.

The German Savings and Loan Society,

526 California Street.

For the half year ending December 31, 1896, a dividend has been declared at the rate of four and twenty-six hundredths (4 26-100) per cent per annum on Term deposits and three and fifty-five hundredths (3 55-100) per cent per annum on Ordinary deposits, free of taxes, payable on and after Saturday, January 2, 1897. GEO TOURNY, Secretary.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from S. J. Holsinger, in the Drummondsville mine, near Forest Home, Amador county, to deposit tailings in Drummondsville creek; and from G. D. Duncan & Co., in the Pebble Bottom mine, near Yankee Jim's, Placer county, to deposit tailings in a ravine, gives notice that a meeting will be held at Room 69, Flood Building, San Francisco, Cal., on January 25, 1897, at 1:30 P. M.

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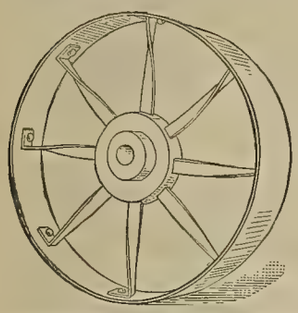
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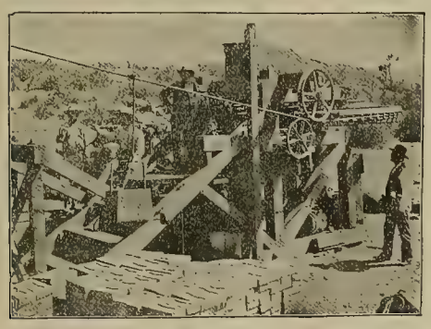
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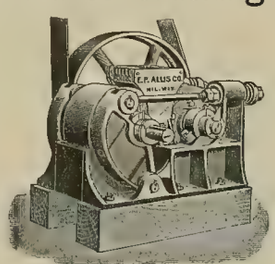
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AND PACIFIC ELECTRICAL REVIEW.

No. 1906.—VOLUME LXXIV. Number 3. SAN FRANCISCO, SATURDAY, JANUARY 16, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Electric Street Car Motors.

On this page appear illustrations of some late devices in electrical street railway motors, as built by the Walker Co. of Cleveland, Ohio. Fig. 1 is of a spring-mounted motor rated at 30 H. P., capable of twenty miles an hour on a level track, and when running on a 33″ wheel at ten miles an hour exerts a draw-bar pull of 1000 pounds. Fig. 2 represents a 125 H. P. street railway motor. Armature winding is illustrated in Figs. 3, 4 and 5; the latter shows the armature of the barrel type; ordinarily such a winding signifies a longer armature; this particular style is so constructed that it is the same length as the old type of armature that connects its conductors across the ends. In Fig. 5 is shown an ingenious device for the protection of the ends of the armature; the surface of the armature on a radial line, even with the bottom of the slots, is produced, forming a part of the cast iron end piece, which is therefore a short cylinder. The end of this cylinder is flared outward, thus forming an iron-clad pocket protecting the ends of the coils. The other end is protected in a similar way, except that the flaring of the end piece is omitted, the ends of the commutator lugs performing that service. Fig. 6 shows the bad effect on the rail joints of the rigid style of motor, which is obviated by connecting the axle of the car by two space bars so placed that the center of the motor is always the same distance from the center of the axle, thus keeping the gears in mesh.

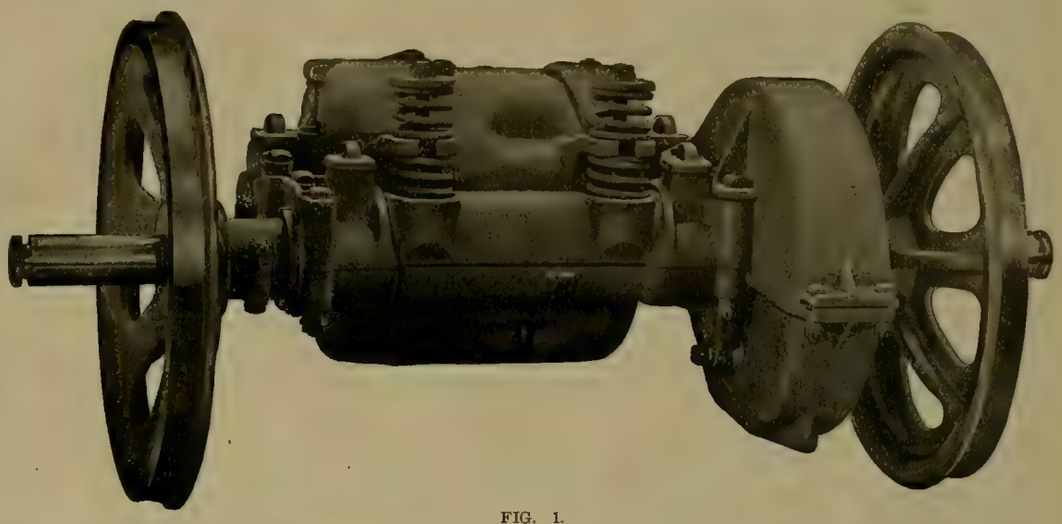


FIG. 1.

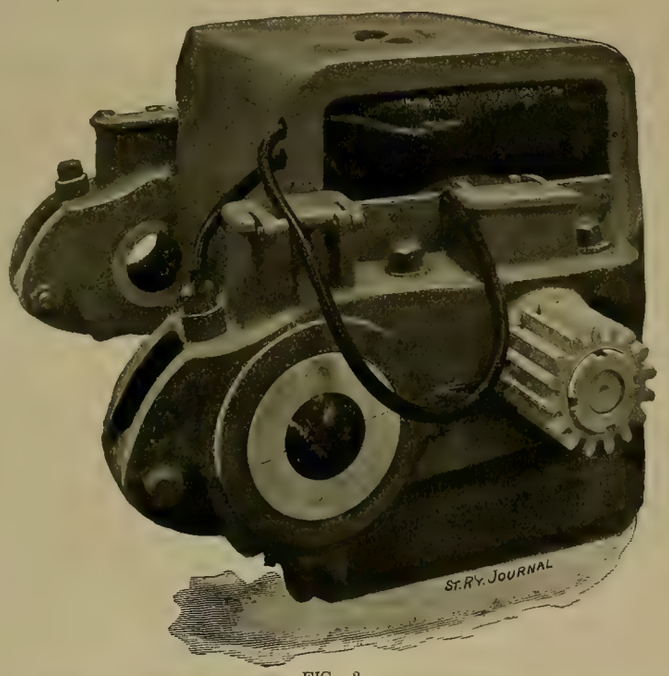


FIG. 2.

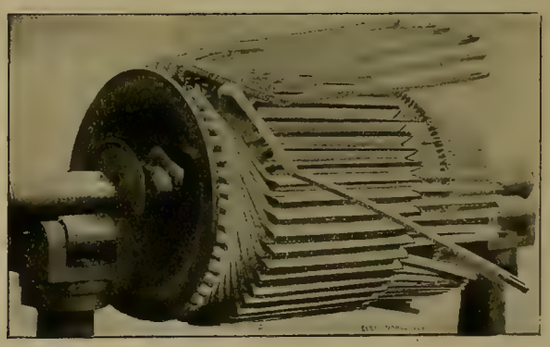


FIG. 4.

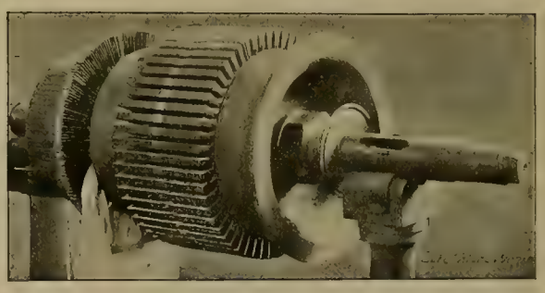


FIG. 5.

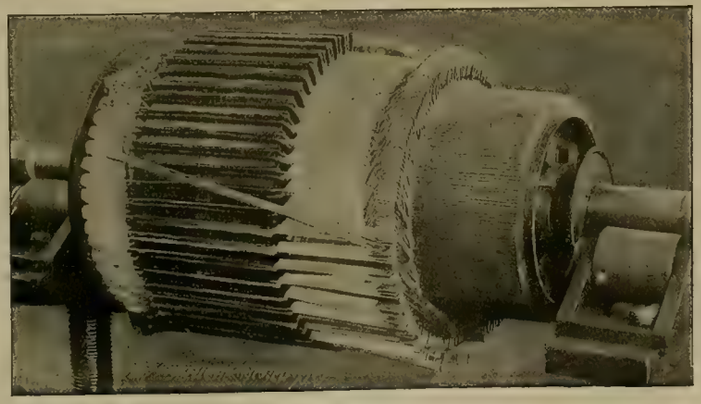


FIG. 3.

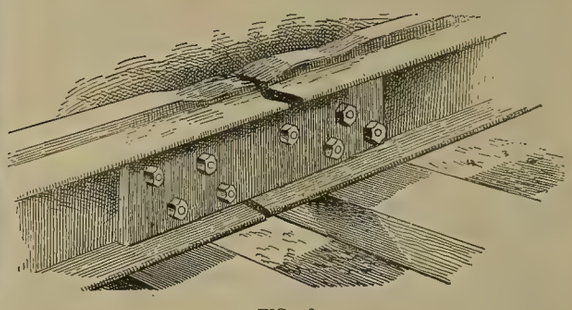


FIG. 6.

DEVICES IN ELECTRICAL STREET RAILWAY MOTORS.

A COMPANY has been organized in Fresno to develop an oil claim in the southwestern part of the county. It is proposed to build a pipe line nine miles long to the railroad.

MINING AND SCIENTIFIC PRESS.

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J. F. HALLORAN.....General Manager

San Francisco, January 16, 1897.

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The Mining Bureau and a Geological Survey.

The Executive Committee of the California Miners' Association has sent letters to the members of the Legislature taking ground against the suggestion of the Governor, made in his message, that the State Mining Bureau be turned over to the University of California. They maintain that the Bureau should be kept in San Francisco as a separate institution. In so far as they refer to the mining work of the Bureau and the maintenance in San Francisco of the museum, they are right and their suggestion should receive the support of all of the mining members of the Legislature, provided something is done to take the Bureau out of politics.

The present State Mineralogist, J. J. Crawford, in his annual report, has suggested that the mining and geological work of the Bureau be separated. In that report he goes on to say that the State has expended a great deal of money for a geological survey without receiving any returns. The geological work that has been done by the State under the auspices of the Mining Bureau and State Geologist under previous laws will, when the time comes for making a thorough geological survey of the State, be almost entirely thrown aside, and it has cost the State fully a quarter of a million dollars. Further comment on the geological work of the State Mining Bureau is hardly necessary.

As to the mining work, a little more can be said; yet the Bureau has done very little compared with what it might have done had it been managed without political interference. As it is, the Board of Directors have very little to say and the members look upon their appointments as nothing more than an empty honor. The State Mineralogist is appointed by the Governor. All of his deputies are chosen through political influence. As a result, since the Bureau was established a very small proportion of the employes have been fully competent for the work they have been appointed to carry out.

If it were not for the fact that in order to secure appropriations from the Legislature some showing had to be made, even less good work would have been done by the Bureau.

As to the Bureau itself, there is need for the kind of work that it could do, and it is not work of such a nature as could be done well by the purely scientific men connected with the University, excepting, of course, the making of a geological survey of the State.

Probably the main reason why Governor Budd has recommended the turning over of all work of the Mining Bureau to the Board of Regents of the University is that he knows that no public body in this State at present would more honestly and conscientiously carry out any trust imposed upon them. However, it seems that it would have been wiser for him to have suggested that the Legislature provide for the appointment of a Board of Directors of the Mining Bureau, each member to hold office for a long time, and give them the power to choose the State Mineralogist and all his assistants, and be entirely responsible for the work of the institution. In other words, a body similarly constituted and with similar powers in relation to their trust as the Board of Regents of the State University.

The members of the Board of Directors of the Mining Bureau have very little responsibility, pay very little attention to the Bureau, and leave the management largely to the State Mineralogist and the politicians he has been compelled to appoint. It is true that the law provides that the State Mineralogist shall appoint competent assistants, but the very manner of his appointment precludes the possibility of his having freedom of choice in this matter. The present State Mineralogist has, to a certain extent, been allowed more latitude than some of his predecessors, and as a result has chosen some exceptionally good men and done good work.

But the system is vicious and the mining men in the Legislature owe it to their industry to see that a change is brought about, so that the Bureau will have some other excuse for asking for an appropriation than the personal appeal of place hunters.

The miners of this State ask very little of the taxpayers and have done more than any other class for the welfare of the commonwealth. What they would ask for the Mining Bureau should be willingly granted if they would at the same time see that a law is framed for its expenditure in a way that will yield good results.

It seems that the recommendation that the geological work of this State be turned over to the State University could not be opposed upon any sensible or reasonable grounds. In the first place let us take the question of cost. The University could undertake to carry out better work with an appropriation of $10,000 a year than could the Mining Bureau with an appropriation of $30,000 a year, even if the Mining Bureau had the required laboratories, libraries and instruments—which it has not. These would cause an additional original outlay of many thousands of dollars. If the work is turned over to the University there would be immediately available the magnificent chemical, mineralogical and other laboratories, which are equal to the best in the country, the best mineral collection and the best library west of New York. More than that, there would be available the services of one of the best corps of geologists, chemists and mineralogists, petrographers and paleontologists in the country. Other men would have to be employed by the Regents, but most of the assistance would come from younger scientists who, in connection with the University, would serve for less than half what the Mining Bureau would have to pay in salaries. Many of them, thoroughly competent young men, would serve for merely nominal salaries.

Then the work would be done upon a system that would be followed out for years and not subject to change, as has all of the work done by State institutions subject to political influence. More than that, the State could not find as competent men outside of the University for geological work.

The value of a geological survey of the State has not been appreciated because the right kind of work has not been done. That which would be of most value and which would have to be conducted by specially trained scientific men is such as has been done in other States in making investigations of particular subjects, such as building stones, mineral springs, oil wells, asphaltum, borax. For example: A good geological survey made in the Randsburg district might save many thousands of dollars wasted in boring for water in places where proper investigation might show it could not exist.

Let the mining members of the Legislature frame a law to take the Mining Bureau out of politics and turn over the work of making a geological survey to the State's fine corps of geologists at Berkeley.

Shall the Debris Question be Reconsidered?

It would seem now that the time is ripe for a reconsideration of the old debris question. Most of the strong passions and prejudices have died out, and there seems no reason why the men of the valley should not co-operate with those in the mountains and foothills for their mutual benefit. It was always contended by the hydraulic miners that they could be held responsible for but a small proportion of the damage that was done; yet, when the case was decided against them and against what they believed to be right, they submitted gracefully.

In the issue of the MINING AND SCIENTIFIC PRESS of Jan. 9th there was published an article on the "Responsibility for the Debris," and in this issue an article on the "Amount of Loss to California Due to Closure of the Hydraulic Mines." Next week this will be followed by something as to the amount of damage caused by the debris now in the Sacramento valley. The data for these articles is taken largely from reports prepared by the Government and by the anti-debris people in their own behalf, and the only people who could reasonably take exception to them are the hydraulic miners themselves.

The first article shows that of all the debris now resting in the Sacramento drainage system, not over one-fifth could possibly have been sent down by the hydraulic mines. More than that, since the closing of hydraulic mines the increase of erosion, caused by the settling up of the foothills and mountains, makes the present amount of debris coming in the Sacramento drainage system nearly as great as it was before the closing down of the mines. In other words, as much evil is being done by debris now as in 1880. The article in this issue shows that the closing down of hydraulic mines caused a loss to the State of over two hundred million dollars. Next week it will be shown that the loss to the farmers of the Sacramento drainage system is small compared with this.

Now the question arises, Cannot the Federal Government, responsible for the navigation of the Sacramento river, the State, the farmers and the miners, co-operate under some system by which all may be benefited?

There have been many suggestions made by the parties interested and the engineers who have examined the case as to what shall be done. The expenditure of large sums for impounding dams is doing very little good, and can do very little good. Some other remedy must be adopted.

The Miners and the Funding Bill.

If the defeat of the Funding Bill in Congress is going to result in a change of ownership in the Central Pacific, and consequently more competition, whoever the owners may be, it is almost certain to lead to great good to the mines of this State and give an impetus to that industry in all its branches. The Southern Pacific Company, while alone here in the field, has done nothing toward developing new districts, but wherever it has come into competition in the southern part of the State it has done much more building of branch lines in order to secure the trade. This is well illustrated in the case of the Randsburg district. There is more need for a railroad, and more business for one, in many of the mining districts along the Sierras than at Randsburg, and if there had been two roads competing for the trade of the mines many branches would have been built long before this, and they would have given a greater impetus to mining than anything else. Capitalists do not care to travel far beyond Pullman cars.

Down at Randsburg, because it has a rival, the Southern Pacific hastens to consider the feasibility of building a branch from Mohave in order to secure that trade. If it were not for the competition of the Santa Fe, the Southern Pacific's nephew and mining engineers would never have taken the trouble to go to Randsburg. In Colorado, where there is competition, branch roads are built into all the mining districts as soon as it is determined that there are good mines. The result has been of great advantage to Colorado in the development of her immense mineral resources, not only of silver and gold, but of iron and coal. Let a competing railroad come into California and then we shall see the Southern Pacific hasten to build branches in order to secure its share of the business.

Concentrates.

TWENTY men are working dry placers in the new district in the Chimehuevas mountains, Arizona.

THE Mercur mine at Mercur, Utah, has made several shipments of ore to be cyanided in Germany.

SANTA CRUZ, CAL., reports the discovery of a quartz ledge in Gold gulch, near Felton, that assays well.

IT is claimed that there are large quantities of good asbestos to be found near Hamburg Bar, in Siskiyou county.

THERE is considerable excitement in Wadsworth, Nevada, over discoveries of paying placer ground in Olinghouse canyon.

IT is said that nearly $10,000 was taken from Canyon mountain, in southern Oregon, during last season by pocket hunters.

ONE business house in Grants Pass, Oregon, recently made a shipment of $15,000 in gold from the placers in the neighborhood.

LEDGES of gold-bearing rock have been uncovered near Glenbrook, Nevada, and have caused considerable excitement.

THE payrolls of the Comstock mines for December footed up a total of $58,368.91, a falling off of over $7000 from the preceding month.

THE Standard mine in the Cœur d'Alene, Idaho, produced last year 10,719 tons of concentrates and crude ore valued at $797,998.17.

THE mining men who are interested in the country adjacent to Kramer, San Bernardino Co., have organized Kramer mining district.

THE Bellefontaine Mining Company of Grass Valley, Cal., have decided to sell enough treasury stock to pay for the erection of a mill.

THE city council of Vancouver, B. C., is considering the question of offering a bonus for the establishment of a smelter at that point.

ARIZONA has a wise law which will not allow the relocating of claims to avoid assessment work and compels locators to do development work.

REPORTS come from Juneau, Alaska, of the discovery of quartz ledges under houses and cabins in the town that have been occupied for years.

AN English syndicate has made an offer of $500,000 for Deer Park mine, at Rossland, B. C., and a meeting of shareholders has been called to consider it.

THE report of the Canadian collector of customs at Rossland shows an increase in collections from $5982.95 in January, 1896, to $12,629.20 in December.

BRITISH COLUMBIA papers claim that there are fifteen mines in the Slocan country whose monthly shipments will aggregate 4000 tons of ore during the year.

AT the time the Randsburg mining district in Kern county was formed years ago 33 votes were cast. Last week 611 votes were cast in an election for Recorder.

THE number of mine leases in Colorado reported by the State Mining Bureau for 1896 was 406; the number of acres leased, 14,310, and the yearly royalties $1940.

EASTERN capitalists who have purchased a large tract of placer ground in the Sweetwater valley, Wyoming, propose to convey the water for hydraulicking by pipe a distance of twenty miles.

CAPT. J. R. DE LA MAR has obtained an option on the Mercur mine in Utah for $1,500,000. This mine has been sought after by foreign capitalists for some time. It has paid in dividends $575,000.

THE new hoisting plant at the Le Roi mine, at Rossland, B. C., is the largest in any metal mine in Canada. It will be running in thirty days and the output will then be increased to 500 tons per day.

THE Calumet & Hecla Mining Company have declared dividends amounting to $48,350,000. Last Monday a dividend of $5 and an extra of $10 were declared, the largest in the history of the company.

A FRENCH syndicate has made an agreement for the purchase for $150,000 of a group of mines in the Sum Dum district in Alaska from W. F. Mills. The claims are on the northern shore of Holkam bay.

DURING the last seven months of 1896 the business of the Cripple Creek Stock Exchange gradually increased from $106,437 in June to $227,675 in December. The total was, for seven months, $1,301,865.

THE projectors of the Sierra Pacific railroad, to run from Stockton into Amador and Calaveras counties, Cal., have been into Tuolumne county to look over the ground, with a view to running a branch up there.

IN the Lady Washington mine, Tuolumne county, under bond to McGillivray & Meek of San Francisco, in the development work good ore has been encountered and arrangements are being made for the erection of a 10 or 20-stamp mill.

THE negotiations for the purchase of the Tomboy at Telluride, Colorado, have been concluded and the property passes into the hands of the Exploration Company of London, for $1,500,000. The deal was managed by Henry Bratnober.

LAST Thursday in the United States Senate a resolution by Senator Stewart of Nevada was agreed to instructing the Committee on Mines and Mining to report on the best means of securing complete statistics of the output of American mines.

THE smelters of Pueblo, Colorado, did a larger business in precious metals in 1896 than any previous year, amounting, according to the *Chieftain*, to $15,443,084. And this was in spite of the fact that the production of lead was worth less in 1896 than in 1892.

IF the recent discovery of petroleum in Cochise county, Arizona, turns out to be of value, it will afford cheap fuel for the reduction of gold and silver ores in that country. In regions where wood is worth from $6 to $8 per cord, such a discovery is not to be undervalued.

B. A. CARDWELL of Salt Lake has bonded two more mines in Meadow Lake valley, the Belle and Joana, from J. Adolph, for $10,000 each. This makes nineteen mines that he has bonded for his company. It is their intention to build a road from Truckee in the spring.

THE new town of Johannesburg has been started near Randsburg by several Los Angeles people, who have formed the Johannesburg Water and Milling Company and have secured a section of land. They are boring for water and propose to erect a 30-stamp mill.

THE Union Pacific Railway is attempting to obtain patents to mineral lands within their grants in the Crown mining district near Cheyenne, Wyo. Protests have been filed with the local land office against issuing patents for fourteen sections, or 8890 acres, in the district.

FOR several months eighty or ninety oil wells at Summerfield, Santa Barbara county, Cal., are reported to have been pumping regularly and shipments of about three carloads a day have been made. The strike of oil made in a tunnel near the town has stimulated the boring of new holes.

THE owners of the Virginia mine and the Revenue tunnel near Ouray, Colorado, have engaged 400 to 600 miners around Joplin, Mo., to take the places of the strikers. It is believed the importation of non-union labor will cause a general strike of union miners in Ouray and San Miguel counties, who number about 2500.

AT the Helena & Frisco mine in Idaho, in which the Exploration Company have lately purchased a controlling interest, several improvements are contemplated, including a Corliss hoisting engine that will be heavy enough to operate the mine to a depth of 3000 feet. A large addition will also be made to the mill.

IT is reported that the North American Exploration Co., composed of Paris and New York capitalists, have obtained an option on most of the stock of the Mammoth mine in Utah at the rate of $2,000,000. The Mammoth has paid dividends amounting to $1,150,000 and the workings have reached a depth of 1600 feet.

UNDER the Enabling act Montana was given 100,000 acres of land for the establishment and maintenance of a School of Mines. The Legislature having made appropriations for a building, the cornerstone was laid at Butte last month. Among the articles placed in the receptacle was a copy of the MINING AND SCIENTIFIC PRESS.

THE Salt Lake *Tribune* states that Colonel H. G. Heffron, who, while superintendent of the Niagara, commenced a series of experiments by which it was demonstrated that the low-grade gold ores of Bingham could be profitably handled by the cyanide process, has decided to go upon the mother lode in California in a short time.

THE miners in the Mojave district propose to ask that a new county be created, to consist of the northeast corner of Los Angeles county, including Lancaster and Antelope valley, extending northward into Kern county, to include Mojave and the Randsburg mining district and taking in all the desert country now in San Bernardino county, Cal.

AT the Comet mine on Berners bay the ledge has been cut at a depth of 1000 feet and it is said that it has been found to continue down in size and value. This will be of importance to the mining industry of Alaska. Heretofore few ledges have been worked to much depth and it has been mere conjecture as to whether they would pay in depth.

THE Colorado State Bureau of Mines examines into and reports upon all casualties occurring in mines. The number of deaths in six months ending November 30th last was 154 and the cases of injury 162. Of the deaths 39 were caused by fall-material, 25 by men falling and 49 by explosives. The total number employed in the mines is reported as 25,545.

THE mines of the Juneau Company in Alaska, owned by Charles D. Lane and Archibald Campbell are under investigation by Capt. Thomas Mein, for English capitalists, with a view to purchase for $350,000. The mines are located in the Silver Bow basin, on the mainland, three miles from the Treadwell mines. A 30-stamp mill is in operation on the property.

A TELEGRAM has come from Denver to the effect that there is a report that there is about to be formed a combine between the smelters of the State on one hand and the cyanide and chlorination mills on the other. This is to be for mutual benefit and it will increase the price for treating ores of all grades. A uniform advance of $2 per ton is said to have been agreed upon.

IN the California Legislature during the week Assemblyman Caminetti introduced a joint resolution instructing the California delegation at Washington to use all honorable means to secure the passage of the mineral lands bill now pending in Congress. Under a suspension of the rules the resolution was unanimously adopted and ordered transmitted to the Senate.

ACCORDING to the Nelson, B. C., *Tribune* the mineral export of West Kootenay through Nelson for 1896 may be safely set down as having slightly passed the $3,500,000 mark. Much of the ore that goes out of the Slocan is not entered in the customs at Nelson, but at Revelstoke, so that the returns from the port of Nelson represent but a portion of the mineral output of the district.

BEFORE the House Committee on Ways and Means last week, in Washington, representatives of smelters asked for lower rates on lead ore, claiming that the importation of lead ore was necessary for smelting, and under an erroneous interpretation of the present law it paid as high rates as 5 and 5½ cents per pound. Duties of 1¼ cents on lead bullion and 1⅜ cents on pig lead were asked.

ACCORDING to a law of the State of South Dakota every corporation must make an annual public statement of its affairs through an advertisement in a newspaper, but so far this has been a dead letter, just as are most laws in this State of the same nature. As an English member of Parliament, who had spent many years in America, said, there are splendid laws in the country but they are not enforced.

THERE is a project on foot to build a railroad line from Spokane northwest through Stevens county and the Colville Indian reservation to Grand Forks, 140 miles, and in British Columbia. It is proposed by those who have sent the engineer in the field to construct an electric line from Spokane to Kettle Falls, a distance of 110 miles, operating it by the power to be derived from the falls at Spokane.

DURING the week the new Mining Stock Exchange at Spokane began business. If properly managed the exchange may do considerable good, especially by discountenancing wildcats. Spokane is the natural business center of a large mining country, including most of the great districts west of Montana. A great majority of the stocks listed on the new exchange are of mines in Trail Creek, Slocan and other British Columbia camps.

THE Exploration Company of London, it is understood, will decline to take the Champion mine at Grass Valley at the price asked for it. The English or French syndicate, in purchasing California mines that are well developed and paying dividends, labor under a disadvantage. The commissions and promotion fees are so large that properties must be purchased at considerably less than their real value in order to float in London without over-capitalization.

F. E. WARD has advertised that he will make an application to the legislative assembly of British Columbia to construct and operate a railway from a point at or near Ashcroft or Kamloops to Barkerville, in the Cariboo country. Last winter A. D. Whittier made an application to operate traction engines from Ashcroft to the mines. A petition signed by about 300 residents of that country against the scheme killed its passage. The greatest opposition came from the freighters.

THERE is apt to be soon considerable litigation as to rights to veins caused by the running of the large drainage and prospecting tunnels in Colorado. The tunnel owners claim to be the owners of veins which have already been opened up in patented territory, if the tunnels were located prior to the discovery of the veins in question and have been worked continuously with due diligence. A tunnel site runs for a distance of 3000 feet and claims 1500 feet on every vein cut in the course of the tunnel.

FROM nearly all the districts on the Pacific coast in which hydraulic mining is being done come reports of increased activity, and many new plants have been or are being fitted up. In Oregon, Idaho, Nevada, Wyoming and Colorado there have been more new mines partially or fully fitted up for this season's work than ever before. Generally, the indications for a good season's supply of water are excellent. The importance of this should not be overlooked, for it promises to do much toward increasing the gold yield of 1897.

THE fact that in all the mining districts of the West there has been a greater increase in the output of gold than in other parts of the world during the past year and that, too, in spite of the fact that millions have been poured into the foreign mines from Europe and very little has come to this country, is apt to make European investors seriously reflect whether, after all, this is not their best field. If this leads to a greater demand for western American mines, it is to be hoped that the papers of this country will do their share toward preventing wild speculation.

A RAILROAD and water route into the Yukon country is projected by Canadians. A report upon the feasibility of the plan has been made and submitted to the Dominion Government, in which it is stated that the best route would be by Lake Teslin and down the Hootalinqua to Fort Cudahy. This, it is claimed, is practicable, and navigation is open from the head of Lake Teslin to the mouth of the Yukon in summer. A light railway, it is claimed, could be built from the Stikeen river, at the head of navigation, about 120 to 190 miles long, which could be operated most of the year. The cost of this is estimated at $3,500,000. It is claimed that good coal can be found along the line of the road.

A SYNDICATE of Eastern capitalists at the head of which is Ex-Governor Pattison of Pennsylvania, has obtained options on 1600 acres of gold mining properties in the Black Hills, South Dakota. The corporation called the Edgemont and Union Hill Smelting Company will take over the Union Hill and other properties acquired. There have been made already arrangements for the erection of a smelter at Edgemont and a 400-ton stamp mill at Union Hill. The output of gold from the Black Hills last year showed an increase of about 25 per cent over 1895, and with the influx of Eastern capital and the new discoveries at Ragged Top and other points there is every promise of a still further increase for 1897.

OF the output of 1896 the Rossland, B. C., *Miner* says that, owing to inadequate transportation facilities, the output of the camp was comparatively light until within the last few months, and even now the second railroad has only begun to take ore away. Despite this fact, at the end of 1896 nearly 40,000 tons of ore have been marketed, as follows: Le Roi, 27,665 tons; War Eagle, 10,000 tons; Iron Mask, 705 tons; Poorman, 340 tons; Josie, 574 tons; Crown Point, 150 tons; Mayflower, 100 tons; Cliff, 75 tons; Evening Star, 25 tons, and other smaller shipments amounting to about 50 tons. The average value of the ore per ton was close to $40. At $35 per ton, it makes the production for the year worth $1,400,000.

REPRESENTATIVE HERMANN of Oregon, before the House Committee on Ways and Means last week, advocated a duty of 10 cents per pound on nickel. He spoke of the resolution of Congress passed in 1891 authorizing the Secretary of the Navy to contract for the purchase of $1,000,000 worth of nickel for armor plate on the assumption that it could not be produced in the United States. Since that time ores had been discovered in various parts of the United States—in Nevada, bearing 15 per cent; in Jackson county, N. C., and Fremont county, Col., bearing 12 to 14 per cent; in Saline county, Ark., and in Washington and Oregon, where there was a mountain of ore. Oregon producers claimed to be able to produce nickel at 4 cents a pound cheaper than the Canadians.

A DISPATCH from New York appears in a Philadelphia paper to the effect that an investment company has been organized in London, in which the Rothschilds are understood to be interested, for the purpose of changing the direction of investments which have been toward the South African mining fields, to the United States. Some of the agents, it says, of that company are now in this country, and others who have recently been here are in London reporting the results of their visits to many of the mining tracts of the West and one or two in the South. The feeling in London was that investment in South African mining has been greatly overdone and speculation had unreasonably increased prices of a large number of mining stocks. Probably the forthcoming reports of the yield of the American gold fields, compared with those of other countries, will do more to turn English capital this way than anything else.

Amount of Loss to California Due to Closure of the Hydraulic Mines.

The losses growing out of the closure of the hydraulic mines are difficult to estimate. They have been:

First—The direct loss of the gold produced by the mines.

Second—The depreciation in value of the property and equipment of the industry to almost nothing.

Third—The loss to sympathetic industries, among them agriculture.

1. *Direct Loss of the Gold Produced by the Mines.*—Statistics bearing on any special branch of gold mining in the State are very meager, and even the amount of loss from closed mines would not represent the real loss, for there are mines which might have started had not the industry been checked. In this regard, however, it is contended by many prominent men in the industry that a large number of the mines were running upon very narrow margins of profit and that this particular form of mining had in the region under discussion reached its highest point. The most valuable gravels were fast being worked out and many propositions had been started in uncertain places. An increase in production would necessitate an increase in water facilities, and in some regions the available water was already in use. The presence of public water upon most divides made it possible to work with but little capital, and hardly a deposit exists that had not at some period been worked more or less. A continuance of mining would cause constant increase in cost per cubic yard, because as the miner washed back from his dump the amount of valueless gravel and lava to be removed increased and the length of sluices, ditches and tunnels increased; therefore the cost gradually approached the value of the gravel until, passing it, the deposit could be no longer worked.

The amount of gravel remaining that may be worked has been partially estimated by the United States Corps of Engineers* at 836,500,000 cubic yards, contingent to the Sacramento river, which at the rate of annual washings given in the last issue of the MINING AND SCIENTIFIC PRESS should be enough to last for eighteen years.

It may be safely assumed that were the mines to start up to-day, unrestricted, neither the tailings discharged nor the gold produced would exceed that of 1880. But the industry would probably maintain this status for many years to come. It is currently stated that the gold produced from the hydraulic mines was nearly $10,000,000 per year; but the facts do not warrant such an estimate.

The following table of county productions indicates the decrease in gold production in the regions affected by law:

TOTAL GOLD PRODUCTION.

Counties—	*1880.*	*1883.*	*1885.*	*1891.*
Amador	$1,507,047	$1,590,000	$2,145,591	$1,395,962
Butte	450,000	630,000	672,568	304,765
Calaveras	580,000	500,000	427,538	738,883
El Dorado	611,000	530,000	418,833	173,279
Fresno	72,000	100,000	74,000	82,607
Mariposa	322,000	220,000	89,000	84,414
Nevada	2,850,000	3,000,000	2,577,373	2,207,887
Placer	1,025,000	810,000	906,301	998,494
Plumas	1,068,839	950,000	840 307	482,462
Sacramento	75,000	490,000	353,522	142,830
Shasta	546,833	210,000	417,004	554,063
Sierra	990,000	1,075,000	1,433,880	701,702
Stanislaus	100,000	40,000	18,000	3,000
Tuolumne	689,599	320,000	310,903	1,384,950
Yuba	1,042,340	455,000	207,448	37,576
Totals	$11,929,658†	$10,910,000‡	$10,892,768‡	$9,292,874‡

Kern, Tulare and some counties partly affected, whose combined production is less than $50,000, have been omitted.

It will be seen that the total production of gold in the region affected by law decreased about $1,000,000 from 1880 to 1885—that is, before and after closing. But if we take Yuba, Placer and Plumas counties alone, the decrease in them was over $1,000,000.

It must be remembered that miners thrown out of employment in the hydraulic mines did not remain idle, but immediately turned their attention to the other branches of the industry. The new impetus given to the other branches of mining immediately began to cover the loss by the closure of the hydraulic mines. The following tables from the tenth and eleventh censuses show the production from quartz and placer mining separately, before the debris litigation and after, and more clearly show the production of the hydraulic mines and the impetus given to quartz mining as well:

	1879-1880.‡		1889.	
Counties—	*Deep Mines.*	*Placer Mines.*	*Deep Mines.*	*Placer Mines.*
Amador	$1,407,047	$100,000	$905,804	$2,422
Butte	.....	450,000	52,261	248,380
Calaveras	435,000	145,000	635,089	91,172
El Dorado	96,881	541,268	77,289	103,414
Mariposa	322,374	.....	16,269	3,785
Nevada	1,100,000	1,750,000	1,715,248	293,331
Placer	175,000	850,000	748,121	462,031
Plumas	820,255	248,584	407,793	91,284
Sacramento	.....	75,000	.....	166,000
Shasta	96,401	450,432	259,316	2,080
Sierra	330,000	600,000	319,452	1,007,834
Stanislaus	.....	100,000	.....	15,955
Tuolumne	129,771	559,826	167,789	44,985
Yuba	.....	1,042,349	5,875	92,498
Totals	$4,912,629	$6,914,459	$5,310,306	$2,535,191

The decrease of placer gold during the period shown by this table has been $4,379,268. Not all of the placer gold was produced from hydraulic mines, and the impetus given drift mining by the closing of the hydraulic mines obscures the true difference. There has also been a certain decrease in the amount of stream gold produced from the seemingly exhausted placers, but the amount is inconsequential. By inspection of individual drift mine records and the list of additional producers it seems that there has been an increase in drift production of about $1,000,000 per year during the period. Therefore, the decrease which would be shown in placer gold had there been no increase in drift production is obscured to the amount of $1,000,000, or the real loss from closing the hydraulic mines is nearly $5,300,000. Had the hydraulic mines been allowed to proceed from 1882 to 1896, as before, California would have produced nearly $72,000,000 more in gold than she has.

2. *The Depreciation in Value of the Property and Equipment of the Industry.*—The property of the hydraulic miner consists mainly of a gravel deposit, water facilities and equipment for mining. It is impossible to estimate the depreciation in the value of the gravel deposits. Few have been sold and these for less than 10% of their former valuation. There is no demand for unworkable mines at any price, and those transferred have been so because they have offered facilities for storage of tailings or for other purposes. There is no way of determining their former value.

In regard to water rights and water installation, slightly more tangible material is at hand. The eleventh census shows 5225 miles of ditches in the area affected by debris litigation, and the average cost of the ditches of which data were obtainable is shown to be $3800 per mile, including reservoirs. This would indicate an investment of nearly $20,000,000, but the water rights and privileges were worth much in addition to the actual cash invested. These ditches in some cases have been turned to other uses, such as irrigation, power, etc., so that they are not a total loss. Others have been abandoned altogether and allowed to go to ruin.

The equipment of the mines in pipes, flumes, tunnels, bedrock ditches, machinery, etc., being unused has gradually gone to ruin. Of five large companies about 30% of the money invested was in water equipment, and the balance in mine equipment, property and working capital. This ratio would show an invested capital of about $66,000,000—$100,000,000 is the amount usually estimated to be invested in the industry. It is safe to say that with no relief in ten years time this amount would depreciate fully 90%.

3. *Loss to Sympathetic Industries.*—The sympathetic industries to hydraulic mining are of every description. Of the $5,300,000 annually produced from the mines a large portion went for supplies, labor, etc., and the direct loss to sympathetic industries is largely included in the loss of gold to the State, or the $72,000,000 before estimated. But the depreciation of the property of these sympathetic industries has gone with the depreciation of the mine values. Enterprises contingent on the mines have become valueless and their property gone to ruin. Everywhere throughout the region houses and shops and in some places whole towns have been abandoned and become valueless. Among the enterprises to suffer most are the farms themselves, for where a ready market was once afforded there is no market at all for the products, and the very people who have brought the industry to its present condition suffer with it.

The assessment rolls of the counties along the foot of the mountains show a depreciation of real estate values greater than the general depression is accountable for. This loss is again impossible to even estimate. If we suppose that the amount of money paid for supplies annually by the miners to the persons who furnished these supplies to be 10% upon the money they had invested in order to produce them, we may get an approximate idea of what this loss amounts to. In table 49 of Bowie's Hydraulic Mining it will be seen that the operating expenses of a number of mines were from 30% to 65% of the gross yield, with an average of about 47½%. This 47½% of the annual yield of $5,300,000 would be $2,517,500 disbursed for labor and supplies. By the averages given this amount would be distributed about as follows: Labor, $1,359,300; supplies, $1,158,200. This amount of disbursement does not include the disbursements for installation or additions to plant, but simply for operating expenses. Probably 90% of that disbursed for labor was in turn disbursed for supplies to miners, or $1,223,370, making a total of about $2,380,000 annually disbursed to people not directly in the industry, and not including the disbursements that have been made in investing $100,000,000 capital in the industry. Since closing the mines this annual disbursement would have aggregated $35,700,000. If this annual disbursement paid to the owners of the enterprises furnishing the supplies represented 10% of the capital invested, the capital contingent to mining would be $23,800,000, or at 5% only, then it would be $47,600,000. Such enterprises are not usually dependent entirely upon one class of customers, but nevertheless the decrease in business affects the owners almost as keenly. This estimate does not include the capital invested in foundries and enterprises which furnish supplies for installation, or for labor occupied in building ditches, etc. The total capital affected may be therefore estimated at $50,000,000, which, added to the $100,000,000 directly in the industry, would approximate $150,000,000 of capital depreciated almost to nothing from closing the mines, or a loss to date of capital and income of upwards of $225,000,000.

Of the supplies used by the mines and miners a large proportion, probably half, come from the farms, or upwards of $1,500,000 yearly, the loss of which trade has added to the general agricultural depression.

* Report on Mining Debris in California Rivers, by Lieut.-Col. G. H. Mendall, p. 35.

† Tenth census fiscal year ending June 30.

‡ Director United States mint.

‡ No account is taken in either table of the silver included in these amounts, for it is proportionally inconsequential between placer and quartz gold.

Nevada City District Geology.

NUMBER VI.

The contact vein lies to the west of the Merrifield, and its southerly part is parallel to it in strike and dip. It is first seen at the Providence mine, where a rich pay shoot has been opened on it. It is also extensively worked on the Champion ground, as well as at the old and new Nevada City shafts. Near the latter it turns rather suddenly, without break, to a west-northwest direction, running across the Chapman ranch. The vein exposed in the Coan mine is probably the same, but it cannot be traced farther than this. It has not been opened extensively to the west of the Nevada City mine. Practically the whole southerly part of the vein lies on the contact between granodiorite and slate. About 500 feet south of the Nevada City new shaft it leaves the contact and enters the granodiorite. It is usually a wide vein, heavily sulphureted—even more so than the Merrifield — carries considerable silver, and shows abundantly the same indications of an extensive overthrust fault fissure, the throw of which must be larger than that of the Merrifield. A very short distance south of the Providence ore shoot it runs into a diabase (exposed on the sixth level) and slate, and closes down to a mere seam. The fissure has a strong tendency to throw out stringers and fissure in the slate foot wall; these have generally a flatter dip than the main fissure. Several such veins and stringers are seen in the Providence mine. A shaft near the Wyoming mill has been sunk on such a vein, which is found to unite with the contact vein. The northerly Wyoming shaft is sunk 900 feet on the incline on a slate vein, which may or may not be the same as that exposed near the mill, and which in depth will probably be found to unite with the contact vein, as it does on the strike near the old Nevada City shaft. Between Indian Flat and Deer Creek the schists contain a great number of seams, mostly dipping southwest from 10° to 40°, and which are sometimes very rich in coarse gold. The hydraulic method has been used in places to wash the surface soil containing the decomposed seams. This locality is known as Red Hill. The Home and Cadmus mines are located on this seam belt, south of Deer Creek.

A short distance northwest of Coan's mine, outside of the area of the map, the contact metamorphosed slate runs out to a point. A little farther on the serpentine and pyroxenite also run out in a point in the diorite, leaving the granodiorite adjoined by a large area of darker, dioritic rock, sometimes containing pyroxene. The Ella or Oro Fino vein cuts across the granodiorite and diorite with a north-northwest strike and an easterly dip of 45°. The shaft is 300 feet deep. The Yellow Diamond has a northwest strike and lies in the chloritic and fine-grained dioritic rocks separating the serpentine from the coarser and more normal diorite. Still closer to the river, in diorite, but near the granodiorite, lie the heavy Ætna and Dement veins, both striking northwest and dipping east. While there is no one continuous and well-defined vein leading down to the South Yuba river from the Nevada City mine, it cannot be denied that there is a system of linked and interrupted veins extending in that direction. On the river, also, three-fourths of a mile above Jones' bar, the diorite and granodiorite are separated by a distinct fault fissure, with easterly dip and northwesterly strike, though at this point there is no quartz present.

In the northeastern part of the Grass Valley district veins more or less parallel with the Idaho east-and-west system predominate. The Spring Hill, Kentucky and Alpha are in serpentine or on the contact between serpentine and diabase dikes, and dip northward at a moderate angle. The Spring Hill is a very heavy vein, impregnated with fine-grained pyrites. The Coe mine is on a very heavy vein, in serpentine, also dipping north. The St John shows a heavy but irregular vein on the contact of serpentine and slate at the 500-foot level, as well as several seams, all dipping north at steep angles. There is evidence of an overthrust fault in this mine. The Crown Point has a vein in serpentine striking northwest and dipping north 75°. Most of the gold in this mine is very coarse.

The celebrated Eureka-Idaho vein is first seen 2000 feet north-northwest of the Maryland shaft, and forms here large, barren outcrops. Between the Maryland and Maslin shafts the vein does not show on the surface, but its continuation is clearly

shown underground. For some distance on each side of the latter shaft there are outcrops which are believed to be those of the Idaho vein. Beyond this the vein cannot be traced on the surface. The Idaho vein dips southward at angles ranging from 50° to 70°. On the Eureka ground it is in serpentine, with a diabase dike in the hanging wall; at the Maryland shaft it is between a serpentine foot wall and a gabbro hanging wall, and then enters the serpentine. Underground, however, most of the vein east of the Maryland shaft lies between a diabase hanging wall and a serpentine foot wall. The vein is remarkable for its strong, continuous ore shoot, dipping east at a moderate angle on the plane of the vein. The vein is 2 feet thick and carries about 1 per cent of iron pyrites, copper pyrites, and galena; the sulphurets contain from $100 to $175 per ton. The average value per ton has been about $28. The annual production of the vein has rarely fallen below $300,000. Attempts have been made to find the continuation of the Idaho vein in the Brunswick district at Chevanne tunnel, but thus far without success. In the southwest corner of the small Brunswick district there is a series of parallel veins, dipping south and striking northwest, which may be considered as belonging to the Idaho system. Of these the Brunswick, Gold Point, Union Hill, Lucky and Cambridge are the principal. All are contained in a schistose diabase tuff, and considerable work has been done on them in former years.

(To be Continued.)

The Solution and Precipitation of the Cyanide of Gold.*

NUMBER V.

By S. B. CHRISTY, Professor of Mining and Metallurgy, University of California, Berkeley, Cal.

It will be seen that Prof. de Wilde makes his cuprous salt in the solution itself, also acidifying the solution at the same time with sulphurous instead of sulphuric acid. This may appear an advantage; I think, however, that the mechanical difficulty of treating a large volume of solution with gas will more than offset the slightly greater cost of the sulphuric acid for the same purpose. However this may be, I prefer my method of making the cuprous salt outside of the stock-solution and from strong solutions, so that the application of the sulphurous acid may be more readily controlled and the production of the cuprous salt more complete. With these slight differences of detail, the methods are the same. Whether the method was first discovered in Belgium or in California is a mere matter of dates.

I have tried the method suggested by Prof. de Wilde, as well as my own, with solutions containing from only $3 to over $600 per ton of gold (from $\frac{1}{20000}$ of 1 per cent gold up to $\frac{1}{10}$ per cent gold), and I have found them both to remove the gold with a sharpness and completeness that is a great relief, after trying the other methods in use.

I find, however, that with Prof. de Wilde's method it is necessary to let the solution stand at least twelve hours before filtering, otherwise all the gold may not be precipitated. In fact, in some cases not the slightest trace of a precipitate will form for several hours, the liquor remaining clear as crystal. At last, however, it never fails to come down. Gently heating the solution hastens the reaction; cold retards it. At the ordinary temperature of the air (60° F.) heating is not necessary for the completion of the reaction, but more time must be then allowed. It is best, however, to allow the filtrate to stand for several hours, another twelve hours if possible, to be sure that no further precipitate comes down. This is where my method has the advantage; being formed in concentrated solutions, my cuprous salt is already reduced and the precipitate forms sooner. I think the reason for the delay in his method is the greater dilution of the copper salt and the sulphurous acid, which retards the formation of the cuprous salt.

I feel sure that this method in either of its forms will prove a valuable addition to our present means of recovering gold from cyanide solutions.

But before the advantages of this method can be duly appreciated it will be necessary to briefly consider the methods for precipitating gold at present in use. There are only two which have made any headway on a working scale, namely, the use of zinc shavings, as recommended by the MacArthur-Forrest people, and the use of electricity, as in the Siemens & Halske process. I shall consider them in inverse order.

6. *The Use of Electricity for Precipitaing Gold from Cyanide Solutions.*

The use of electricity for depositing gold and silver for electroplating has been practiced successfully for so many years that it would seem that this method would be a simple, expeditious and practical method of precipitating gold from the cyanide solutions obtained by leaching gold ores. But a little reflection will make it clear why so many processes for this purpose which have been patented have never been heard of since.

In electroplating it is possible and practicable to use: 1, soluble gold anodes, by which the counter-electromotive force of the precipitated metal is entirely neutralized; 2, concentrated solutions of the double cyanide of gold and potassium, so that the specific resistance of the solution is low; 3, an electrolyte of constant composition, whereby the proper working conditions may be constantly maintained after they have once been reached.

None of these conditions can be secured in precipitating the gold from a cyanide ore extration solution.

It is true that in the Siemens & Halske method a soluble anode of iron plate is used; but all the cyanogen that combines with the iron is lost, ferrous cyanide and finally Prussian blue being formed to no useful purpose. The principal difficulty, however, is one that cannot be obviated, viz., the high specific resistance of the dilute solutions that must be used. With solutions always containing less than 1 per cent, and sometimes less than 0.05 per cent, of free cyanide, and perhaps 0.001 per cent of gold, or less, the resistances are something enormous, and with any other metal than gold no one would think of precipitating such a solution with electricity. The high specific resistance of the solution may be met by using an increased surface of anode and cathode and by artificial circulation, but this can only be done at an outlay and with a complication which robs the method of its cheapness, simplicity and convenience.

My attention has just been called to a corroboration of these views in an article entitled "Zinc vs. Electricity," by Mr. John Yates, South African *Mining Journal*, September 26 and October 3, 1868, where an interesting comparison of these methods of precipitation is given.

It is true that electrolytic methods of precipitation are used in the analytical laboratory as convenient methods of analysis. But a long experience with these methods on a small scale has convinced me of the great difficulties which will always stand in the way of their application on a large scale. It is one thing to electroplate an article with gold in a strong solution of aurocyanide of potassium with a gold anode which constantly adds as much gold to a solution as is precipitated, and it is quite another to precipitate all the gold from a solution with an insoluble, or even an iron, anode when the solution contains perhaps 0.05 per cent of cyanide of potassium and perhaps 0.001 per cent of gold. Here the problem is to reduce the gold content to 0.00001 per cent (or from $6 to 6 cents per ton solution). Any one who has attempted this recovery (which is 99 per cent of the gold contained in solution), without at the same destroying most of the cyanide present, will agree with me that it is no easy task.

There is another difficulty that I have met with. Under certain circumstances the gold is precipitated not only on the cathode, but also on the anode; and, in addition, in many cases of the treatment of the solutions produced from ores a precipitate settles out from the electrolyte which also contains gold. The reason for the first difficulty seems to be that when the current decomposes the salt $KAuCy_2$, it decomposes it not into $K, Au+2Cy$, but the K alone goes to the cathode, while the acid radical, $AuCy_2$, goes to the anode. The deposition of gold which appears on the cathode is due to the metallic potassium attacking and reducing gold as a secondary reaction from the solution there adjacent. Great density of current and long treatment will finally throw out all the gold on the cathode, but there is enough force in this tendency to greatly retard the electro deposition of the gold.†

I have been able, by acidifying the solution with dilute sulphuric acid, to get fairly complete precipitation in a reasonable time, say, twelve to twenty-four hours, on a small scale, both with insoluble anodes (carbon, platinum or lead) and with soluble ones (zinc, iron or copper). Of course, in this case the cyanide is destroyed, unless special steps are taken to recover it. The precipitation is much more rapid and complete from these dilute gold solutions when the reaction is acid than when it is alkaline or neutral.

The difficulties which I have pointed out in the electrolytic method may be met by great technical skill, as has been the case in the Siemens & Halske process, and in that way, when they are reduced to a minimum, the method may be crowned with success. But in the absence of such skill it is bound to be a failure, and the difficulties are of such a serious and fundamental nature as to lead to the desire for another and simpler plan.

(To be Continued.)

*Colorado meeting American Institute of Mining Engineers, Sept., 1896. (Revised Proofs Dec. '96.)

† A similar state of affairs has been shown to be the case by Professor Hittorf (*Ostwald's Chemische Energie*, 2te Auf., ii., 880) in the electro-deposition of potassium-silver cyanide. I have also noticed a similar state of affairs with copper. When a solution of potassium cuprous cyanide is electrolyzed with a platinum anode at a voltage below that at which metallic copper is deposited on the cathode, yellowish-brown crusts of cupric cyanide separate out on the anode. These dissolve in the electrolyte when stirred. Fragments of the crusts that drop from the anode on the cathode are reduced to metallic copper. At a higher voltage metallic copper comes down on the cathode from the solution generally. I have also noticed a similar thing in electrolyzing potassium aurocyanide with platinum electrodes. In order to see this action clearly, it is necessary to avoid an excess of free KCy.

Rapid and Slow-Drop Stamps in Colorado.

From Our Special Correspondent.

The stamp-mill capacity of Black Hawk, Central City and Nevadaville is shown by the following list of the mills in the district:

	Stamps.
Penn Mill	25
Iron City	25
Randolph	50
New York	75
Gilpin	50
Black Hawk	125
Eagle	35
Polar Star	40
Prize	25
Meade	40
Hidden Treasure	75
Climax	25
Kipp & Buell	60
Vendome (old mill)	25
Vendome (new mill)	30
Gold Coin	18
Total	748

Of this number, about 500 stamps are now dropping. Of the mills, all have the old Gilpin county slow-drop stamps, excepting the new Vendome, the Iron City, Eagle and Penn, the last-named having ten rapid-drop stamps and fifteen slow-drops. The slow-drop stamps run about thirty drops to the minute and the rapid-drops about sixty-five. The slow-drops will crush on the average about one ton to the stamp per day and the fast-drops, it is claimed, have about double that capacity. The slow-drop Gilpin county stamp weighs 525 pounds, drops 19 inches in a low mortar with deep issue. It is maintained by a staunch advocate of the old style mill that, owing to a peculiarity of the ores handled, better results are obtained from a slower motion than from the more rapid—that where a little time is not given for the materials to settle, it will either scour off the plates or not come in contact. In the same mill the average amalgamation is about two-thirds, inside. The plates used are 4½x8 feet, in connection with which is the well known Gilpin county bumper, for concentration.

On the other hand, competent millmen here, who are operating both the rapid and slow-drop stamps, and who have been making tests of the same ore in the two kinds of mills, assert that, with the rapid-drop stamps, the milling capacity is not only doubled but the results on the plates are more satisfactory, a better saving being effected. They maintain that better results are attained by the rapid motion, and that, by giving the plates the proper inclination, the danger of scouring them off is obviated. The new rapid-drop mills are equipped with modern appliances, which require no handling of the ore from the bins till the process is complete.

While it cannot be denied that the old-time Gilpin county mills have always done good work, and that they made Gilpin county mine development possible in earlier days, the general belief is that they will gradually be supplanted by the fast-drop stamps as rapidly as changes are made, and that new mills will hereafter be of the later pattern. There are conditions now existing which have to be met by the stamp mills, calling for more rapid work and, if possible, closer saving. The Denver and Pueblo smelters now make a much lower charge for treatment than formerly, and the Gulf road makes the following freight rates on ore from Black Hawk to Denver, which are regarded as very low and advantageous to mine operators: Ores below $10 per ton in value, $1 per ton; ores running from $10 to $30, a rate of $1.50 per ton; running above $30, a rate of $2 per ton. Under these conditions, a much larger proportion of Gilpin county ores go to the smelters than formerly. It is estimated now that about 1500 tons of ore per month are being shipped to the smelters, and that the year's work shows an increase of from 25% to 35% of smelter sulphurets over those of 1895.

This all means, not a decrease of mill work, but a heavy increase in the production of the district. It means that such ores as are non-amalgamable, not adapted to either mill or concentrator, which formerly would not pay to ship, are now capable of being sent to the smelters at a profit. The iron and copper pyrite nature of these ores makes them desirable at the smelters.

The Rocky Mountain concentrating mill at Black Hawk, which treats from 1000 to 1500 tons of ore per month, is doing very satisfactory work with the ores heavy in iron pyrites, and is successful with those of a low grade as well as the higher grade. This plant distinctively fills a place in the district, since it is able to handle that class of refractory low-grade ore which would not bear shipment to the smelters and with which the stamp mills can do nothing. It should not be overlooked, however, that all the mills of the county apply a subsidiary concentration, which enables them to effect a higher saving than they have sometimes been given credit for.

An item having some bearing upon the relative merits of the slow and rapid-drop stamps for this district, is the fact that the Vendome Company, having a 25-stamp slow-drop mill, this year put $30,000 into a 30-stamp rapid-drop plant, which is now operating at full force, while the old mill is inactive. I do not overlook the fact, though, that the bulk of the work of the county is being done by the old-style mills.

Central City, Dec. 30th, '96. WASCOTT.

Mining Summary.

CALIFORNIA.

Amador.

Ledger: The drift south from the 700-foot level in the Central Eureka has been reopened and extended 200 feet. In the bottom a large mass of quartz has been encountered which carries good looking sulphurets.

Lane & Hayward, who have been operating the Treasure mine and sunk the shaft 400 feet, have suspended operations and ordered everything to be taken out of the property.

The Baliol mill on Sutter Creek is nearing completion.

The Eastern owner of the Pocahontas has ordered the shaft driven to the 1000-foot level before any prospecting of the ledge be done.

Butte.

Mercury: On the Middle Fork below Mooretown there are four small stamp mills.

Placer claims are being worked by J. H. Grubbs at Mooretown, Williams & Sons, Kitrick Bros., Dougherty and Nelson at Lumpkin.

Savage and Garrison are working DeLapp's claim on the Middle Fork, and some other claims are being operated on the same stream.

The Gold Bank mine at Forbestown has a 40-stamp mill, canvas plant and chlorination works. About 100 men are now employed, and the Golden Queen mine, recently purchased by Mr. Scow, is being worked through the Gold Bank.

S. O. Conlyli has just completed a 5-stamp mill on his mine by the river.

The Burlington mine will be prospected by two shafts 500 feet apart, striking the ledge at a depth of 400 feet.

An Eastern company is running a tunnel on the Missown mine and are in 400 feet. They expect to tap the ledge within 35 feet.

Calaveras.

Angels *Voice*: The Maltman mine has been cleared of mud and water—the accumulations of thirty years. The shaft, which is down about 80 feet, has been put in good condition and sinking has begun.

W. H. Clary, Jr., of Railroad Flat has a bond on the Petticoat mine at that place, and has everything in readiness to pump out the water.

Mountain Echo: The machinery on the Great Western mine, owned by F. Baumhogger, was started up for the first time last week, and the work of sinking the shaft and otherwise developing the mine will now be carried on.

Chronicle: The Lone Star or Hurley mine at West Point has been sold by the sheriff to J. R. Smith. The mine, mill and ditches brought $16,500.

A shipment of 67 ounces of gold was made from the North Star gravel mine last week.

The mill at the Moser mine has been shut down and about half of the force of men discharged. The work of sinking is being prosecuted, and it is expected to have everything running in full blast by the 1st of February.

Old works were broken into at the El Encino mine last week; and owing to the large body of water encountered, all work had to be suspended. The company intend to at once rid the mine of water, when operations will again be resumed.

Angels *Voice*: The mines at Copperopolis and at Campo Seco are idle, and the production of copper for the past few years is from the leaching of ore piles.

In the Madison mine the inclined shaft has reached a depth of 1350 feet. Levels are opened at every 100 feet, the longest being at the 900 level, where a drift extends 1000 feet north toward the Gold Cliff, and also from the shaft 500 feet south. Other levels are each several hundred feet long. The surface plant consists of water-power hoist and air compressor and a 40-stamp mill. Air drills are used almost exclusively in this mine. Thirty-eight men are employed.

The Iron Rock, near Angels, after years of idleness, is being reopened by Geo. W. McNear of Oakland. Five men are employed.

At the Carson Creek mine near Robinson's Ferry a new air compressor has been put in and the mine systematically developed. The hoist and 40-stamp mill are run by water power. Forty-two men are employed.

Citizen: The new 40-stamp mill at the Gwin mine is crushing low-grade ore from the 1200, 1300 and 1400 levels. The ledge at the 1400 foot level, which was cut some time since, shows up 15 feet wide. No stopes have been started as yet, the ore being taken from the breasts. The mill is illuminated by sixty electric lights, furnished from the new electric plant.

At the Venus mine at Campo Seco the shaft has been sunk to a depth of 100 feet and crosscutting has begun. Several stringers have been cut, all of which prospect well. Preparations are now being made to erect a hoist.

A new 40 horse-power double engine has been built for the Ford mine.

El Dorado.

(Special Correspondence). — The Jeffrie Gravel Mine Co., one and one-half miles east of town, is completing a 10-stamp mill. The tunnel has reached 625 feet, and 100 feet additional will be run, when an upraise will be made to the channel.

The tunnel on the Union quartz mine, one mile from town, is now in 300 feet, and 130 feet more will reach the shaft, which is 140 feet deep on a 6-foot ledge.

J. V. Selby, who has bonded eighty acres on the Larkin ranch for a Montana company, expects to let a contract this week for 200 feet of shaft and other development work.

Isaac Y. Doan, the San Francisco oyster king, has bought a one-third interest and associated himself with L. D. Graeter in the Jeffrie gravel mine.

O. W. Frost has begun work on the property recently purchased from Skinner & Co., one-half mile north of town.

Nugget: J. L. Houx of Shingle Springs has bonded to E. McCue, El Dorado Flat, below Shingle Springs.

A shaft has been sunk on the Manzanita gold quartz mine, Kelsey district. It is following a 4-foot ledge with good prospects.

Hill Bros., of El Dorado, have finished a run on ore from their mine adjoining the Union gold mine, El Dorado district, milled at the Union gold mine, that netted $40 per ton.

Sinking at the Amazon, Kelsey district, is stopped on account of too much water. Drifts are being started from near the bottom.

Inyo.

Register: A syndicate has an expert at Fish Springs district with a view to getting most of the claims on the hill.

A. G. McAfee's copper claims twenty miles northeast of Alvord are attracting attention since the bonding of the Sanger-Danielson copper properties at Saline valley. This is one of the most extensive copper croppings on the coast.

Kern.

Californian: Mining men are interested in the discoveries being made in Keysville and Havilah districts.

H. W. Blaisdel has closed down his works on the O'Brien property, but intends to resume shortly.

About eighteen mining claims were filed for record to-day, most of them from Havilah and Kernville.

Mariposa.

Gazette: The Merced Gold Mining Company has about thirty men employed on the tramway. The dam is nearing completion.

Wm. McGinn is negotiating for the sale of his mine in Quartzburg, the Number One, to California capitalists.

Nevada.

Union: The hoisting works at the Indian Ranch mine have been put in and are now running.

Union: Supt. Dawson has commenced sinking the shaft at the Gold Hill mine. The mill is kept running most of the time, although the vein at present is a rather small one.

Transcript: The Eagle Bird is about to change hands, and it is expected to start up in a month.

Placer.

Sentinel: Woods, Bailey & Co. have finished their contract for the Blue Canyon Mining and Development Company, and the directors have put on men by the day.

Work was commenced last week on the Buena Vista quartz ledge, in Bunce canyon. Captain H. Newton of Lincoln and Geo. A. Tubbs of San Francisco have purchased a half interest from Thos. Buckley. The Buena Vista ledge is about 3½ feet in width.

G. B. McCullough and D. H. Mills, who own the M and M quartz mine, on the lower end of Gillis hill, are building a ditch from Niggar ravine to their ledge.

Plumas.

Bulletin: The Quincy Mining and Water Company have completed their debris dam at Green flat, work on which was interrupted by the early storms in October. The company have fitted up their mine at Bean hill.

McElroy, Konradi and McElroy are working Gopher hill diggings with success.

At Johnsville the new Jamison mill, S. W. Cheyney, manager, has begun crushing ore. The ten stamps crush thirty tons daily. Thirty men are employed.

The Four Hills Company have resumed running and crushing ore with the 10-stamp mill. About twenty-five men are now employed.

It is understood that the Plumas-Eureka mine will resume work next spring.

Independent: All work has stopped at the Thistle shaft for the present. The water for several days past has raised fifteen inches in twenty-four hours. The source of this supply is generally believed to be from a rift in the pipe clay over which a stream had heretofore run.

The new tunnel in the Bald Mountain Extension drift mine, being run for the upper part of the channel, is making good progress through soft bedrock. Pay gravel is still being taken out from the lower ground. There are at least three miles or more of undeveloped channel northward to the end of the Extension claim, besides the deep, lava-capped, ancient river beds of what were evidently secondary streams and other leads above unprospected.

San Bernardino.

Independent: J. W. Wilson and Wm. Baldridge have sold their group of five claims at Twenty-nine Palms to H. U. Mudge of the Santa Fe, and development work is going rapidly forward. Four shafts are now down 45, 25, 50 and 18 feet, respectively, the ore body running from 2½ to 3½ feet in thickness and ranging in value from $18 to $220 a ton—free milling. They now have in contemplation the erection of a 10-stamp mill at Wilson's place, at Twenty-nine Palms, on Deadman's lake.

Two months ago Superintendent Church came down from the north for the people who had bonded the property from E. J. Baldwin, hired twenty men and put them to work on the old Gold Mountain mine, in the Bear Valley district, on which no work had been done since the burning of the large stamp mill twenty years ago. Work has been suspended and the men notified that there will be no resumption of operations.

San Diego.

Sentinel: At Picacho the assessment work has been done on 250 mines during the past two months.

The Golden Dream mill will soon be ready to run.

In the White Gold basin the Pleiades group of five mines leads off with the largest bodies of ores discovered in this section. Col. Allen has ordered a 60-ton mill for his group.

The Capella group of five mines, situated also in the White Gold belt, is being opened preparatory for another 60-ton mill.

Shasta.

Free Press: E. P. Connor has contracted with the Mountain Copper Company to sell them 3000 tons of low-grade ore from his mine on Salt creek.

Sierra.

The old Hawkeye mine at Potosi, owned by Overstreet, Todd & Co., is employing ten men. Good paying ground is being worked.

Colonel Massy of Chicago is having considerable work done on the copper mine on the north fork of Canyon creek. It is said that this lode yields a large percentage of copper. A contract has been let to run 300 feet of tunnel to tap the lode.

The mill has been closed down and most of the men have been laid off at the Sierra gold mine. It is understood that they will start up again as soon as they can devise some means of saving the sulphurets. About nine men have been kept to run the tunnel.

Siskiyou.

News: Work is progressing on the Brown Bear group of quartz mines, Salmon river. The ledge has been tapped by tunnel 400 feet below the croppings, with richer ore than in any of the upper tunnels.

The new company that purchased the Last Chance mine, near Callahans, has constructed a canal and turned Scott river through it, to work the bed of the river with an elevator.

Mr. Fore and associates have purchased hydraulic property on Salmon river.

Tuolumne.

(Special Correspondence).—In the Providence mine, near Carters, sinking and tunneling have developed a large body of ore, and an arrastra will be put up for making tests, with a view to putting up a stamp mill.

Machinery for a mill with a capacity of sixty tons a day has been purchased in San Francisco for the Modoc mine, owned by George McGillivray and W. E. Meek of San Francisco. This is a new mine, near the Buchanan, discovered about three months ago. A pay chute has been opened up over 400 feet long, averaging 15 feet in width, with ore that will all pay from $6 up to very rich streaks that give high yields.

Union-Democrat: At the Confidence the 30-stamp mill is completed and was started up last week. Twenty miners are employed.

At the Arbona a 200-foot tunnel taps a vein varying in size from 2 to 5½ feet in width, the ore of which gave an assay value of from $6 to $60. Drifts have been run north and south and sinking has been commenced.

A tunnel is being run to tap the vein below the shaft on the Mohican, near the Seminole group.

The Morris Bros. of Chinese Camp have struck high-grade ore in the Andrew Johnson mine. Arrangements are being made for working the property on a large scale.

Banner: Additional stamps are to be placed in the App mill.

The foundation for a 20-stamp mill is being laid at the Miller & Holmes mine.

A new mill is to be erected at the Golden Rule this spring.

The Soulsby mine has started up its mill.

The Jumper people are preparing to place an electric plant on their property. The power will be taken from Sullivan creek.

The Bellview mine and property have been sold to the California Exploration Company for $150,000. The new owners took possession last week.

NEVADA.

The cyanide plant on the property of the Dexter Mining Company at Tuscarora has started up again under the direction of Manager Fuller, and the output increased twenty-five tons daily. The plant, which was working most satisfactorily when the cold weather settled over that locality, was out of doors, and at the first freeze-up was shut down. Means were devised to overcome the cold and the result was the housing of the tanks, the erection of a boiler and the heating of the plant with steam.

Pioche *Record*: The strike in the old West Point claim, west of town, has renewed interest in that vicinity and several claims which it was proposed to let run out were protected by the owners at the last moment.

Central Nevadan: Forty men are employed at the Adelaide copper mine, near Golconda, this winter.

Lyon County *Times*: Considerable work has been done on the Logan & Hully mine, and it is reported that the old Welter mill will be torn down and moved to the mine and work commenced on an extensive scale. There is low-grade ore enough in sight to keep a 10-stamp mill running for ten years.

Walker Lake *Bulletin*: At Silver Peak the tunnel on the Mary mine is in 860 feet, the last 40 feet being in porphyry and quartz, which resembles the old Comstock very much. A few weeks ought to develop pay ore.

Tule canyon placers are still turning out gold.

Leidy, Raush and others, White mountains west of Fish lake valley, have average assays of $21 in gold, 74 ozs. silver and 40 per cent lead.

Pioche *Record*: The main topic of conversation at De Lamar at the present time is the big strike in the Magnolia mine at Helena.

The strike in the old West Point claim west of Pioche has renewed interest in that vicinity, and several claims which it was proposed to let run out were protected by the owners at the last moment.

Austin *Reveille*: The Keystone mill has been started up preparatory for a regular run.

The Wenban-Cortez mill at Cortez is running day and night at full capacity.

The quartz mill at the mouth of the Lander Hill tunnel in Pony canyon, at old Clifton, will be completed in a very short time by the Austin Mining Company.

Gold Creek *News*: At the Oro Grande mine a ledge of ore gave an assay value of $27 a ton in gold. The owners have given Ogden people a three-fourths interest to develop the property and put a mill on it.

At the Gold creek placers the reservoir will when finished hold over 900,000,000 gallons of water. It covers 137 acres. The plans contemplate the further raising of the dike and dam 25 feet when its capacity will be increased to 3,000,000,000 gallons. The inlet ditch will also be completed this month. It is 8 miles long 4 feet on the bottom with a 3¼ foot grade and is designed to carry 3000 miners' inches. Work on the distributing ditches will proceed during the winter to prepare for placer mining in the spring. Then 40,000 yards of gravel a day can be handled, much of which carries more than a dollar in gold to the yard.

OREGON.

Baker City *Democrat*: There are now about twenty men at work at the Maxwell, on Rock creek, and it is expected that the mill will be started up within a few days.

About twenty miners are at work at the Baisley-Elkhorn mine under the management of Mr. Symms, and it is expected the mill will again be running soon after January 1.

A. Geiser, superintendent of the Bonanza, has bought for $15,000 the Pyx and will operate it this season.

Bedrock-Democrat: In the Cracker Creek district the North Pole is developed 3000 feet or more, one tunnel being 1700 feet in length. An upraise of 500 feet in height is about completed. In the lower, or Baring gold tunnel, the ore vein is 6 feet in width in the face, and ore is of high grade and concentrating in character. In the stopes the vein is 8 feet in width. In the upper levels the vein varies from 6 to 12 feet in width.

Grants Pass *Mining Journal*: A short bond has been given to Tacoma parties on the Big Mountain mine in Missouri Flat.

About forty men are employed on the Black Gold Channel mines building a reservoir and ditches.

The purchasers of the Olalla placer ground have organized as the Paradise Alley Mining Co. and are now pushing work rapidly. Over fifty men are employed.

Rogue River *Courier*: The Black Channel mine is being run by the old Shotwell Company of Seattle and forty-five men are employed.

Baylord & Iliff's pumping plant is in operation on the banks of Rogue river. Six men are employed at the plant and fifteen in the timber cutting wood for it. Eight cords are burned up in twenty-four hours. Already a big hole has been piped in the bank.

The nickel mine at Riddle will, it is said, start up in the spring.

WASHINGTON.

Spokesman-Review: The Lalla Rookh group of mines on Colville mountain, two miles above Cascade City, was bonded about a week ago to Toronto parties for $75,000.

The Young America and Cliff Consolidated Mining Company has been incorporated with a capital stock of $1,000,000 to work the Bluff, Sunset, Young America and Cliff, within one-half mile of Bossburg, Stevens county. A compressor plant has been arranged for.

BRITISH COLUMBIA.

Several discoveries have been made close to Vancouver City. Copper deposits have been located on Frederic's Arm. Copper deposits directly opposite Vancouver and four miles across the inlet have also been located, while other copper claims have been staked close to the water dam which supplies the city with drinking water.

Spokesman-Review: The War Eagle mine at Rossland has been sold by Patrick Clark to the Gooderham-Blackstock syndicate, Toronto, Ontario. The price is in the neighborhood of $850,000. Up to the present time the War Eagle has paid $187,500 in dividends and has large reserves of ore. It was located in 1889 by Joe Morris and Joe Bourgeoise, and passed through all of the ups and downs, mostly downs, to the discouragement of the owners, before passing into the hands of the present company, in 1894. Systematic development was commenced the same year, and in the summer of 1895 the first dividend, of $37,500, was declared. This syndicate some time ago purchased the Crown Point. A new corporation will be formed, and will include the War Eagle, Crown Point group of mines, the Tiger and Uncle Sam. All of these, excepting the War Eagle, are located in the south belt of the Rossland district. In addition to these, a number of Slocan properties will be included.

At Rossland the recent discoveries of high-grade argentiferous galena on the south belt, in addition to the known existence of auriferous copper and iron sulphides of shipping value, have greatly stimulated work in this section of the camp.

A seven-drill compressor has been placed on the Homestake and a contract let for the installation of a ten-drill plant on the Lee.

North & Govan have cabled their agents to commence work on the Little Darling and Flossie L. at once.

At Ainsworth Braden & Mathews, owners of the Tariff, have bought a boiler and pump and will put on a large force of miners at once and will begin shipping ore.

The King Solomon Company will also begin work very soon. Theirs is a high-grade silver proposition.

The Dellie is still making good progress with their tunnel, having driven nearly 300 feet. At 250 feet in on the tunnel a stringer of rich ore, running nearly parallel with the tunnel, was cut.

From East Kootenay, near Fort Steele, during the past year, the North Star mine shipped 3300 tons of ore.

The Invicta Hydraulic Company are pros-

pecting for the channel on their claims on the Wild Horse. They are now taking good pay 50 feet above the bedrock.

A Montreal syndicate will put in a bedrock flume on Perry creek, about 30 miles from Fort Steele.

A number of claims on Perry creek have been opened up this winter and several have been bonded to outside people.

Spokane *Chronicle*: In the Deadwood camp of the Boundary district, the Great Hope mine has been sold for, it is understood, $12,000.

It is estimated that the necessary plant and machinery for the complete equipment of the Currie mine, near Silverton, B. C., will cost about $20,000.

Mining Journal: J. E. Young, who has been in charge of the Pittsburg dredger, states that about forty days were spent in operating and prospecting with the dredger. For the last few days from $40 to $70 per day was taken out, and the work was much interrupted by unforseen difficulties that experience only can overcome. The last work was done on nearly bare bedrock, the rock being decayed, and was dug out several inches in depth, and in this most of the gold taken out was found. The machinery gave out several times, but can be easily remedied. While the cost of the dredger was more than was figured on before beginning, and the results so far not brilliant, enough was done to satisfy them that this pattern can be worked successfully and money made with it in the river beds of Cariboo. The Underwood dredger will have some changes in its machinery, but will no doubt be operated next season. The Alexandria dredger did not pay. Other parties from Chicago, Pittsburg and other sections contemplate going into dredging, and the question of cleaning up the rich beds of old rivers in Cariboo will without doubt in some way be solved in the near future. So far, while no dredger in the country has been a complete success, it cannot be said, with the exception of one or two cases, that they have been a failure. Within a few years there will be dozens of dredgers on the Fraser, Quesnelle, Nechaco, Blackwater, Smoky and other rivers in British Columbia.

UTAH.

Salt Lake *Tribune*: The vein developed in the Silver King is perhaps the largest that has been uncovered at Park City, and at one station is as much as 127 feet between walls, the quartzite supporting and the lime underlying the ore body. At the same point is a breast of ore 110 feet in width, while at places it is over 60 feet in depth.

It is said that overtures have been made to the owners of the Independent Tesora, at Mammoth, and that as soon as the workings from which the water is now being pumped are dried, an expert examination will take place to determine what price shall be fixed upon it.

At Richfield the Butler-Beck mine has been sold at auction to Judge W. W. Wallace for $8578. It is one of the oldest and best known mines of Gold mountain, and the auction price is considered almost nominal. Upon the several claims has been done about 1000 feet of development work, that has showed up the ledges in good shape, the largest vein being 5 feet wide and assaying $12 gold, 2 to 5 ounces of silver. The new owner announces that he will commence active operations in the spring. The mill is not large enough to properly handle the ore, and one of the first requisites will be a series of tests to ascertain the best method of treatment.

Mammoth *Record*: The new air compressor and machinery of the Emerald Company have been placed in position and are now in operation. The shaft is down 410 feet, and sinking at the rate of about 2½ feet a shift will be continued to a depth of 700 feet, when drifting will be commenced on the 600 and 700 levels.

Shipments from Tintic district for the past year nearly equal the amount shipped from all the other camps in Utah combined.

Tribune: The deal in which Capt. De Lamar has contracted to pay $1,500,000 for the Mercur mine is doing much to stimulate interest in the diggings of the camp, and it is reported that negotiations have now commenced between Charles Butters and the owners of ground over there in which ore enough has already been blocked out to justify the erection of a mill early the present season.

Bingham *Bulletin*: There were twenty-eight certificates of location filed in the recorder's office of West Mountain district between the 1st and 4th insts. Included were several well-known former locations, jumped by parties who knew them to be delinquent but valuable.

The 200 level of the Winnamuck is showing six feet of ore that averages fifty ounces in silver.

The force on the Starlus mine is to be increased.

Mercur *Mercury*: West Dip continues to be the Mecca for mining men, and the week has seen no diminution of the rush to that section. A great deal of bonding and leasing has been done, and several sub rosa sales are reported. The De Lamar people are still operating the Daisy group under their option. La Cigale is opening up greater ore bodies. On the Patterson group the vein has been uncovered and ore running $2 and $3 exposed. The Mercur Gold Production Company has $4 ore in its Edna May claim, and good prospects for a mine at little depth. Scheu and Mayne have the vein in the Black Dog and Gray Rooster, while north of Ophir canyon they are developing the Mississippi, Black Pearl, St. John and Emma groups, and have defined the vein in each of these properties.

Several representatives of big English concerns have been in the camp. The first to arrive was Prof. Mitchell, who has been here some weeks, ostensibly making a study of the geology of the camp. He was followed by Charles Butters from Johannesburg, who is popularly supposed to be here for the purpose of experimenting with the ores with the Siemens-Halske process. Later in the week V. M. Clements arrived. He was of the staff of John Hays Hammond at Johannesburg. It is said E. Bates Dorsey is also en route to the camp.

Tintic *Miner*: The showing now being made in the Bullion-Beck is reported to be the finest in the history of the mine. Local parties who visited the workings of the mine this week say that there is more ore in sight than they ever before saw in any mine.

It is reported that the drift on the 700 level of the Grand Central has reached the ore channel.

Lester Taylor, Thomas Wimmer and Ed Collet of Payson purchased a two-thirds interest in the Defender and one-fourth in the Ruby claims, lying west of the West Cable property. The drift on the 700 level of the Grand Central is now in 700 feet and is being pushed with the greatest possible haste toward the ore body.

IDAHO.

At Silver City the Trade Dollar group milled during the year 7892 tons of ore in its 10-stamp mill, saving 92.41 per cent of the assay value. One carload of ore, weighing 22,846 pounds, shipped to the smelter, gave returns of $50,438.87.

Spokane *Chronicle*: At Florence in the Banner the principal shaft is down 100 feet and a contract has been let to sink 100 feet more. At the 100-foot level drifts are being run 200 feet each way. All the drifts and shafts are in a good class of free milling ore. A 10-stamp mill will be put in in the spring.

On the Gold Bug the principal tunnel is now in about 500 feet, which gives a depth of about 125 feet. The ore body averages 2 feet in width.

One company which has been placering in the Florence basin for a number of years is said to have taken out more during last summer than in all the five years preceding that put together.

MONTANA.

Butte *Miner*: A rich strike is reported from the Gold Flint. On the mine in the past a great deal of money has been spent and it has yielded its owners several hundred thousand dollars. The lead was lost several years ago, and after the property changed hands several times the big lead is again found.

Inter-Mountain: The Colorado company began operations last week on the Betsy Dahl, at Meaderville. A shaft-house has been erected, the engine and boiler are now in place, and in a day or two the work of pumping out the mine will begin.

The old Amber mine, at Marmion, in New York gulch, twenty miles northeast of Helena, promises a largely increased output for the year. It is being operated by Buffalo, N. Y., capitalists and is under the management of Prof. J. H. Kerr. To treat the concentrates a cyanide plant will be erected as early in the spring as the work can be accomplished. The machinery and material for the new plant has been purchased.

A. M. Esler, who has been running the Eureka mine at Rimini since last spring, has during the time mined and concentrated 10,000 tons of ore. The property has given employment during the time to about 100 men.

The improvements at the Original have been completed and a few men put to work. Sinking will be begun in a few days from the 800 level.

The Colorado company has arranged for the purchase of the Old Glory at Centerville for $45,000.

Inter-Mountain: At the Boston & Montana works the concentrator, which had been closed for three months, has been started up and forty men put to work in that department alone. The management announces that every department will henceforth run full blast, and that as soon as provision can be made for them 200 more men than were ever before employed will be at work.

Western Mining World: Work is resumed on the Consolidated Mining Company's property, Cable district.

William Cliff of Gilt Edge is driving a tunnel in 200 feet on his coal property. When completed this will put over 10,000 tons of coal in sight, for which he receives $2.50 per ton at the mine.

At Clancy sixty men are on the pay roll of the East Pacific mine, the property lately purchased by R. A. Bell.

A syndicate has a diamond boring drill in operation near Missoula, prospecting coal beds.

SOUTH DAKOTA.

Black Hills *Times*: At the new district west from Ragged Top and across Spearfish canyon, over 500 claims have been located and recorded, with probably double that number simply staked. Float rock is found in abundance that assays from $4 to $280 gold per ton. Development work is retarded by the deep snow.

The new machinery and castings to remodel the Richmond silver mill in Galena camp to an 80-stamp gold mill have been ordered. The Union Hill Company are now working forty-five men on their Richmond-Sitting Bull mine at Galena and taking out a large amount of ore.

A large vein of silver-lead ore carrying a little gold has been opened up on the Silver Mountain group of claims, near the head of Slate creek. Assays show 45 per cent lead and 98.7 ounces silver per ton. The vein has been opened at several points for 300 feet in width and shows a stratified mass of quartz, slates and schists.

The report is current that siliceous ore similar to the Ragged Top ores has been discovered at Bull springs, near Hell's canyon, in the limestone belt in Custer county. Custer is reported nearly depopulated.

There was a great deal of relocating claims going on New Year day, though so far as heard from but a very little jumping. Those who might be disposed to jump claims have been quieted by the recent action of the miners at Ragged Top.

Another Ragged Top camp has been found in the Spearfish Buttes, up the canyon from Spearfish town. The discovery consists of a 3-foot vertical vein of ore in the limestone formation.

The St. Elmo M. & M. Co. having demonstrated the value of the ore in their claims, near Hill City, by runs in their 2-stamp mill, have decided to erect a 20-stamp mill.

Work has been resumed in the Ruby Bell mine in Ruby basin, after four years of nearly continuous idleness.

COLORADO.

(Special Correspondence).—The Mountain Chief mine, adjoining the Tom Boy, near Telluride, was recently sold by A. J. Clark and B. W. Thayer to L. H. Jackson of Denver for $100,000, there being a cash payment of $15,000. The Mountain Chief is partially developed.

Rocky Mountain News: At Cripple Creek the output of the principal producers for 1896 in smelting, chlorination and cyanide mill ores was as follows:

	No. of Tons.	Value per Ton.	Total Value.
Portland	28,000	60	$1 648,000
Independence	10,000	90	900,000
Isabella	10,000	60	600,000
Doctor	6,000	100	600,000
Elkton	1,000	65	455,000
Victor	14,000	31	434,000
El Paso	6,000	62	372,000
Anchoria-Leland	4,800	65	312,000
Strong	3,200	90	288,000
Moose	2,600	90	234,000
Union	1,400	60	264 000
Gold Coin	5,000	40	200,000
Last Dollar	5,000	40	2 0,000
Anaconda	6,200	30	186,000
Jefferson	2,000	75	150,000
Moon-Anchor	2,400	45	108,000
Prince Albert	2,300	45	103 500
Ironclad	3,000	40	120,000
Theresa	1,200	70	84,000
Raven	2,700	30	81,000
Vindicator	1,500	45	82,000
Garfield-Grouse	600	120	72,000
Pharmacist	1,000	50	50,000
Tillie	2,500	40	50,000
Gold Crater	2,000	30	60 000
Nellie V.	400	120	48,000
Legal Tender	1 600	25	40,000
Arcadia	600	75	45,000
Christmas	700	45	21,000
Lucky Gus	800	40	32,000
Geneva	1,000	30	30,000
Los Angeles	600	40	24,000
Grouse	600	45	27,000
Abe Lincoln	400	50	20,000
Sq. M. Tunnel	200	90	18,000
Granite	300	60	18,000
Half Moon	300	50	15,000
Work	750	30	22,500
Colo City	250	40	10,000
Lincoln	150	40	6,000
Thompson	120	50	6,000
Bogart	100	60	6,000
Coriolanus	150	50	7,500
Keystone	300	35	10,500
Republic	200	30	6,200
Favorite	400	30	12,000
All others	30,000	54	1,638,000
Total	193,420	..	$9,726,500

Republican: At Idaho Springs tellurium ore has been cut in the Chicago Bell vein. It is 4 inches wide and came in in live rock after it had changed from the surface quartz.

J. H. Shepherd is opening some new bodies of ore in the Shafter mine through the lower level in the 600-foot shaft. The streak is all pay and measures 30 inches wide.

In the Jack Rabbit mine a new body of ore has been opened through the adit level, and the streak measures 2½ feet wide.

The Eagle River Tunnel and Mining Company has incorporated with a capital stock of $3,000,000. The scene of the company's operations will be on Battle mountain, on ground lying between and adjacent to both the towns of Red Cliff and Gilman. Some forty claims owned by Cheeseman and others and fifteen owned by John J. Hill and others, which will make fifty-five in all, have been consolidated. The preliminary work to starting a large development, drainage and transportation tunnel in the quartzite on the Battle mountain side of Eagle River canyon, near Gilman, in what is known as Eagle Bird gulch, will be begun at once.

The number of mineral surveys in 1896 was almost double the number of 1895. The following table shows the number of surveys approved in each county of the State:

County.	1895.	1896.
Boulder	11	25
Clear Creek	23	39
Custer	10	1
Chaffee	5	5
Dolores	1	2
Douglas	..	2
El Paso	375	803
Eagle	3	5
Fremont	22	155
Gilpin	24	31
Gunnison	15	27
Huerfano	1	..
Hinsdale	8	8
Jefferson	1	1
Lake	82	52
La Plata	6	2
Mineral	9	2
Montezuma	4	1
Ouray	11	7
Park	9	15
Pitkin	11	11
Rio Grande	2	1
Routt	..	8
Summit	21	8
Saguache	3	4
San Juan	11	15
San Miguel	13	8
Totals	681	1,238

At Cripple Creek Cramner Brothers have sold a half interest in their lease on the Trail to Christopher & Lanterman for $8000, and a lease on the Big Ranta of the Arequa Company for $1000, and the entire group for the entire 600 feet of the main lease on the Trail is to be consolidated and worked by the joint owners.

Jennings Brothers have opened the second chute in their Gold Hill territory, and find there richer ore than in the first one opened on the Gold King of the Alliance Company. This time it is in the Lillian Leland of the Anchoria-Leland Company.

A sale is under way for a controlling interest in the stock of the Mars Consolidated Company, which owns a group of properties on Cripple Creek Heights, now being worked by a number of lessees.

At the Hallett & Hamburg at Victor new machinery is to be put on at once and the 4½-foot ore body opened at the 100-foot level will be made to produce more heavily after the improvements are in place.

Contracts have been let for 100 feet of sinking on the Little Tom, on Cow mountain, being worked by W. E. Jones and J. E. McDuffie. A strong vein has been opened in the property.

NEW MEXICO.

Silver City *Enterprise*: At Pinos Altos the Bell & Stevens has been started again on ores from the Pacific and Mina Grande veins.

Rathbun brothers have a shaft 150 feet deep on the Monarch mine, with drifts running north and south from the shaft at the 100-foot level. The pay streak is 8 to 10 inches wide and averages $50 per ton at the smelter.

The Treasure Mining Company keeps a force of fifty men employed at the Atlantic mine and mill and makes regular shipments of bullion and concentrates.

W. C. Chandler has twenty men at work on the three upper levels of the Mountain Key.

At Central a strike of rich ore has been made in the bottom of the Texas shaft at a depth of 252 feet.

At Copper Flat fifty men are employed by the company, thirty in the mines and about twenty putting the machinery in place for the new smelter.

At Santa Rita members of a new company of Colorado who have leased the Oxide, Chino, Guadaloupe and Yosemite mines, owned by the Santa Rita Copper and Iron Company, will arrive to-morrow. This company has put up a cash capital of $100,000 to do development work and extract ore.

A crew of eight men has been put at work extracting ore from the Elnora mine. The mill will be started before the end of next week.

At Carlisle the Steeple Rock Company is employing 250 men on the properties. A steam hoist has been placed upon the Jim Crow and development is being pushed. The company is extracting from the Nugget mine, the Davenport claim and several other properties. Ten stamps and Huntington pans will be added to the mill, with which ore will be crushed and experimental tests made to demonstrate the best method of treating the ore. After a process of treatment is decided upon an extensive plant with a capacity of several hundred tons per day will be erected.

Santa Fe *New Mexican*: In Grant county the Elnora mill at White Signal is completed and will shortly be started.

At Central the Texas Company are working twenty-five men in their mine.

Las Cruces *Democrat*: A rush is taking place to the Jarilla mountains. Hardly a day passes but parties are seen headed for that camp. There are some of the finest turquoise properties in the Jarillas to be found in the Territory, while others are rich in copper and some have gold and silver in paying quantities.

ARIZONA.

Yuma *Sentinel*: Last week at La Fortuna mine, near Yuma, a new chimney of ore richer than anything heretofore struck in that mine, was opened up on the 300-foot level.

The Excelsior Gold and Silver Mining Company of Kingman is inviting bids for hauling 800 tons of material from that place to White Hills and vicinity. The company owns the Norma and Treasure mines. Five hundred tons of wood pipe will be used in bringing water from Hand springs, seven miles distant, to the mill at White Hills.

Prescott *Journal-Miner*: The Planet-Saturn Company's mill, at Fool's gulch, has been started up. The mine is opened up to a depth of 700 feet, and there is 6 feet of good ore at the bottom of the shaft. Since the company purchased the property, about fifteen months ago, they have done about 5000 feet of development work.

Tucson *Citizen*: Ex-Senator H. A. W. Tabor of Colorado and his brother have a small force of men at work at the Vulture mine. There have recently been tests made of the tailings from the mine that show them to be very rich, running about $3.50 to the ton. At Smith's mill, where the Vulture mine was once located, about 15,000 tons of tailings have been worked the past two years, from which was cleared about $50,000. Such good results being obtained by use of the cyanide process caused Senator Tabor to have an investigation made of the tailings from the Vulture.

Phœnix *Republican*: The Canon copper mines in Coconino county have been bonded for $13,000 to a Boston company.

An abandoned mine, which was being worked evidently fifty years ago, has been discovered near Mountain Springs, seven miles from Hillside and fifty miles west of Prescott. The mine was well developed and is rich in gold. The ore is a red iron oxide.

Jerome *Reporter*: W. P. Dorsey located an onyx claim in 1885 on the lower Gila, near the Real ranch, which may prove of value. The vein crops out for a distance of 1000 feet and varies in thickness from 1 to 40 feet. Mr. Dorsey recently sent some samples of the onyx to Tiffany & Co. and was advised that if it could be mined in large blocks it would be worth $1 a pound. A force of men will soon be put to work taking out the mineral and a sample carload will be shipped East.

At Congress there are about 400 men on the company's pay-roll. The cyanide plant is approaching completion; the roaster has a capacity of 100 tons per day. The building which covers it is 170x75 feet, and it is understood that a mill of eighty stamps capacity will soon be put in in addition to the forty stamps now in operation.

Geologic Mapping of the Mother Lode.

Written for the MINING AND SCIENTIFIC PRESS by H. C. HOOVER.

There has been some agitation of late by the California Miners' Association and others looking toward more geological work by the State. Various plans have been proposed for carrying forward such work, but in every case there appears a profound lack of information upon the scope, object and cost. The proposition to map the mother lode in detail seems to be the most prominent project.

The application of geology to mining beyond the outlining of the controlling geologic principles of a region is a matter to be determined in each specific mine. The searching out of the general principles is the work of the Government, and their application is the work of the miner. In the first case the work benefits the class and in the second it benefits the individual, and it is no more the business of the Federal or State Government to undertake such work than to advise the miner as to his health.

The United States Geological Survey has mapped and is now publishing a series of atlases upon a scale of two miles to the inch, covering the whole Sierra gold belt. In order to more thoroughly understand the nature of the region a detailed study was made at Nevada City and Grass Valley districts, and an atlas published upon the scale of 1000 feet to the inch. Such detailed work throughout the region would be of value, but the expense would not be compatible with the good which would result. The general atlases, together with the studies of typical localities, cover all of the points which it is the duty of the Government to determine. To do more would be to make an expert report upon the value and prospects of each mine, something that neither private owners nor public policy would permit.

Moreover, the Government has no more right to encroach upon the business of the prospector or engineer than upon that of the physician. It is said that detailed topographic maps would be of value to all enterprises in the region, but the increased cost over the present maps would not be commensurate with the increased service rendered. For instance, if an individual wishes to build a ditch he engages an engineer to make the surveys. The engineer studies the maps now published and learns the general route of the ditch. To furnish more data than this would be to survey the ditch itself, for no amount of detail contouring could dispense with the survey. The same applies to the location of a gravel channel or a quartz ledge.

Valuable scientific work can only be performed by specially trained and experienced men. Because a man knows the difference between pay and barren rock is no indication that he can determine the underlying geological principles of the district. To get the services of such men costs money. The United States has for years provided a bureau in charge of the best men and it has increased in efficiency and economy until there is no better or more economical work done in the world. The cost of the general atlases now published of California is from $5 to $11 per square mile. The Nevada City special folio, covering an area of 35.39 square miles, upon which every detail of geology and mining data has been outlined, was $280 per square mile. To map the whole region now covered by the general atlases upon this scale would cost $1,960,000. To map the mother lode would cost $350,000.

The State of California contains 158,000 square miles, of which the United States Geological Survey has topographically mapped 35,000 square miles. Of this about 15,000 square miles have been geologically mapped and 7,000 square miles published. The largest portion of this work lies in the Sierra gold belt. If the State of California wished to do geological work there is plenty of ground to cover without repeating, and that, too, of great value to the State. But the most valuable geological work has not been accomplished by areal mapping, regardless of the value of the region. It has been, as in the States of Pennsylvania, Arkansas and Missouri, by special work upon special subjects by specially trained men. For instance, a complete report upon California's borax or asphaltum or gold, describing their geology, mining, reduction, markets, and the cost and profit therein would be of the greatest value. Such work has been done and has yielded vast returns for the money invested, and that, too, with less annual appropriation than that of the State Mining Bureau of this State.

Electrical Progress.

An Electric Locomotive for Switching.

The use of the electric locomotive for switching purposes in steam freight railroad yards is likely to receive a marked impetus by the fact that one is now employed in connection with the New York, New Haven & Hartford Railroad, at New Haven, Conn. This locomotive is in constant service, switching freight cars between the main line of that road and a number of factories located along the river front. The line over which it operates is about two miles long and is the property of several large manufacturers. The track is of regular steam railroad type, with heavy steel rails, well ballasted and provided with switches and turnouts. In addition to the curves, there is a 2½ per cent grade against the load both ways on each side of Grand avenue.

The practice followed by the manufacturers hitherto in switching their cars has been for the freight engines of the N. Y., N. H. & H. R. R. to drop their cars at the Junction; from here they were hauled to the different factories by horses. This method was so slow, with the several curves and grades, and so hard upon the horses that the manufacturers were driven to the conclusion that some other method of traction must be employed. Steam traction was rejected, for the excellent reason that the line runs for some distance along a frequented thoroughfare, where a switching engine would be a dangerous adjunct. That the steam locomotive would also be standing idle under steam for a large part of the day and consuming coal uselessly, was also a weighty consideration.

Electric traction was finally adopted as presenting many economical and other advantages, and an order was placed with the General Electric Company for a 30-ton locomotive, which the company could guarantee could haul two loaded freight cars up a 2½ per cent grade at a speed of seven miles an hour.

The locomotive was delivered at New Haven on Dec. 8th, on the 11th was put into actual operation without preliminary test on the line, and since that date has been handling the entire movement of the cars between the factories and the Junction.

The dimensions of the locomotive are as follows:

Weight	58,000 pounds
Draw-bar pull	7,000 pounds
Length over draw-bars	16 ft. 6 in.
Height over all	11 ft. 6 in.
Width over all	8 ft. 3 in.
Wheel-base	5 ft. 6 in.
Diameter of drivers	44 in.
Number of drivers (with cast iron centers and steel tires)	4
Size of journals	5½x8 in.
Gauge	4 ft. 8½ in.
Voltage	500
Amperes, full speed and normal draw car pull	600
Amperes, half speed and normal draw car pull	300

The motors are two in number, each axle being provided with its own motor. The motors are gearless and are supported upon a system of spiral springs resting on the side frames of the locomotive track. The suspension being entirely upon springs, the wheels are free to adjust themselves to the irregularities of the roadbed, and the wear on both tracks and motors is thus consequently diminished.



ELECTRIC LOCOMOTIVE FOR SWITCHING.

In the armatures the iron-clad type of construction has been followed—that is, the windings are placed in a mica-lined slot cut in the surface of the laminated core. The armature and commutator are upon a sleeve, through which the axles pass. The sleeve rests in bearings on the motor frame. Two projecting arms from the sleeve fit into the openings in an iron plate loose upon the axle, and similar projections from the wheel enter the plate from the other side, so that, as the armature revolves, the wheels are revolved also. This coupling, being flexible, allows perfect freedom of motion. The commutators are of substantial construction and each motor has four sets of brushes.

The truck is constructed of I beams and forms the foundation for a locomotive cab, of sheet iron, with sloping shields at each end. It has two hinged doors, one on each side, and sliding windows at the sides, the front ones being stationary. As there are windows on all sides, the motorman has a view in all directions. The interior of the cab is finished in cherry and contains the rest of the electrical equipmet—automatic circuit breaker, controller, lightning arrester, reversing switch, air pump, air gauge, etc.

The controller is the L, two series parallel type, arranged for the control of two motors. It is of the same general type as the K2, with which our readers are familiar in ordinary street car practice, and is provided with separate reversing switch and the magnetic blow-out. The resistances are set beneath the shields and are of the packed ribbon type.

The automatic circuit breaker is of 500 amperes capacity and involves also the magnetic blow-out principle, as does the lightning arrester, which is set upon the floor of the cab behind the controller. In the front of the cab and above the controller is a circular dial ampere meter, reading to 500 amperes, and facing the motorman is the air pressure gauge. On the other side of the cab, opposite the controller, is an oscillating cylinder air pump, driven by a motor. This furnishes air to two air tanks suspended beneath the cab and is automatic in its action.

The air pressure pump is controlled automatically by a pneumatic governor, consisting of a cylinder containing a piston working against a spring. The action of this automatic control is as follows: A pipe running from the main reservoir enters the cylinder below the piston. As the pressure rises, the piston is forced upwards against a spring. The other end of the piston rod carries the contacts through which the pump motor circuit is made and broken. When the pressure falls below that at which the automatic control is set, the spring forces the piston down and the circuit is broken. Any arcs that may be formed when the contact is broken are blown out in the magnetic field. The locomotive is provided with a chime whistle, blown by the compressed air, and a railroad headlight is set upon each shield. Beneath each one of the shields is an iron sand-box provided with pneumatic feeding device.

Its operation is already attracting considerable attention from railroad engineers who have visited the scene of its operation. In order to show one of these engineers what the locomotive would do, six loaded cars were hauled up the steep grade with the slack all out, the start being made on a grade of about 1 per cent; 150 amperes only were required to start this heavy train, and it moved off smoothly.

Scientific Progress.

Reduction of Manganese Ore.

In the *Annales de Chimie et de Physique* Mr. Henri Moissan, the eminent chemist, gives the following directions for the preparation of manganese from its ores by reducing them electrically. Pure protoxide of manganese is mixed with carbon and heated in an arc of 300 amperes at 60 volts. In five or six minutes a complete reduction will have been effected, and a button weighing from 100 to 120 grammes remains at the bottom of the crucible. The reduc-

tion can be made with a 100-ampere 50-volt arc, and takes from ten to fifteen minutes. Operating with an excess of carbon, the following analyses were made of the metal obtained:

	1.	2.	3.	4.
Manganese	85.60	85.82	90.60	94.05
Carbon	14.50	13.98	10.20	6.35

If the reduction take place in the presence of an excess of oxide the quantity of carbon is much less, and in some experiments only 4 to 5 per cent was obtained. Manganese, when prepared in this way, can only be kept in open jars, if it contain but little carbon; when the proportion of carbon increases the moisture of the air decomposes it speedily. Small fragments placed in water oxidize in twenty-four hours, giving off a gaseous mixture of hydrogen and carbide of hydrogen. The decomposition in air is more active as the proportion of carbon approaches that of the carbide of manganese. Starting with natural manganese binoxide, as pure as possible (97.5 per cent), mixed with carbon and previously calcined by Perrot's method, and using currents of 500 amperes at 50 volts in a closed crucible, an ingot of the following composition was obtained:

	1.	2.
Manganese	80.78	91.13
Carbon	7.59	6.41
Slag	2.06	1.78

Thus 96 per cent of the oxide used in the experiment was reduced. M. Moissan thinks that this reaction is easily applicable to the commercial preparation of metallic manganese, and, as the molten metal can very well be refined in an excess of oxide, manganese free from carbon and silicon can be obtained. The manganese obtained from the last experiment was much harder than ordinary commercial varieties. When no carbon is present the metal is very hard indeed.

The Stars of the "Dipper."

"The seven stars in the Great Dipper," says Mary Proctor in *Popular Astronomy*, "are in reality seven splendid suns, probably very much larger than our sun, and glowing with intense luster. Iron, sodium, magnesium and other well-known elements exist in the atmosphere of these stars, and their massive globes, raging with fiery heat, rush through the depths of space with inconceivable speed. Five of the stars are receding from us at the rate of seventeen miles per second and the other two are traveling in an opposite direction. It is certain that these two do not belong to the same system as the other five. Thirty-seven thousand years hence the seven stars of the Great Dipper will have dissolved partnership, and its appearance will have changed. The handle of the Dipper will be bent and its rim out of place, for the reason that five stars will have drifted in one direction and two in another. During countless ages the stars which seem so steadfast have been rushing onward through space. There are stars traveling in 'family parties,' as Miss Clerke quaintly expresses it, colonies of stars of a friendly tendency drifting together, others less friendly drifting apart. Despite the fact that each star thus urging its way through space is an enormous mass of glowing vapor, yet the most perfect order and harmony prevail in the star depths."

A REVOLUTION has been quietly effected in the methods of refining copper, and nearly half of that produced in this country is now refined by electricity. The method consists in electroplating the metal from an anode composed of the "blister" or impure copper, the strength of the current and the composition of the liquid both being so chosen that nothing but copper is deposited upon the cathode, the impurities in the crude metal falling to the bottom of the tank in the form of mud. The great electrolytic refinery of the Anaconda Company in Montana produces from 100 to 120 tons of refined copper daily by this process, and is the largest plant of the kind in the world. A similar refinery at Perth Amboy, N. J., has a capacity of 10,000 tons of refined copper per annum.

Mechanical Progress.

The Metric System.

A correspondent writing to the London *Engineer* offers the following to show why the metre is not a measure for the standard, and is an inconvenient standard of length for the mechanical work:

"The metre was originally fixed without reference to practical considerations of convenience and utility, but simply as a theoretical fancy, to adopt the one hundred thousandth part of a degree of latitude as the standard measure, with the idea of basing the measure on the earth itself, irrespective of any minor consideration of utility. Unfortunately, this was subsequently upset by more correct measurements of the earth, showing that the metre was not really the one hundred thousandth part as intended, and it has now consequently to be referred to an authorized standard metallic measure, like other standard measures.

"A good practical illustration of the objection to the metre can be given from one branch of mechanical engineering—locomotive engineers. The cylinders are spoken of and thought of as 16-inch, 17-inch, 18-inch, 19-inch, etc., diameter, but in metre nomenclature these would be 630 mm., 669 mm., 708 mm., 748 mm., and they are so dimensioned on foreign engine drawings. Now, 16, 17, 18, 19 are convenient figures to speak of and to think of, and convey simple and definite ideas, but such figures as 630, 669, 708, 748 are cumbersome and inconvenient, and fail to convey a simple and definite comparison. As another illustration, the driving wheels are spoken of and thought of as 5 feet, 6 feet, 7 feet, 8 feet, diameter, but in metre nomenclature these would be 1.968, 2.362, 2.756, 2.949, and they are so dimensioned on foreign engine drawings, even more cumbersome and inconvenient than in the case of the cylinders.

"The two standards of measure—feet and inches—afford a striking facility and convenience in mechanical work generally, as in locomotives, inches for cylinders, axles, plate thickness, etc., and feet for wheels, frames, wheel centers, boilers, etc. In the original proposal of the metre an attempt was made to provide other units of measure by a pretty-looking series of decimally arranged standards: Kilometre, hectometre, decametre, metre, decimetre, centimetre, millimetre; but this, it was found, would not work and the standards are practically reduced to the two extremes, the kilometre of 1000 metres and the millimetre of 1-1000th metre. Of these the kilometre—about .62 mile—is alone found a convenient and useful measure, the millimetre—4-1000ths of an inch—being too small for general dimensions of machinery, and not small enough for fitting dimensions, as gauges and templates."

Compressed Air Locomotive.

This month the new compressed air locomotive for the Sixth avenue elevated railroad in New York City, with a cargo of compressed atmosphere, will be placed at the head of a train of cars, and will make its first trip. That the compressed air engine will soon be the entire motive power of New York elevated roads is believed by many. The engine just completed is built under the Hardie patents. These surface motors are a part of the cars which they propel, while the newly constructed locomotive is an engine in itself, entirely distinct from the train which it may haul. The new engine in appearance is very like the ones now in use, only it has no smokestack or the usual appliance necessary where there is combustion of fuel and escaping steam. In operation it is also like the present motor, as it is an engine which gets its power from compressed air instead of from steam. In the place of great coal sheds there will have to be a central plant, where, by means of steam engines, air is compressed into huge reservoirs with a pressure of 2000 pounds to the square inch.

In the present engine the power is created by combustion as the train proceeds, and the steam is also used to operate the brakes. In the new engine enough power is taken on at the start to last for from 10 to 20 miles, and the compressed air is also used to control the brakes. The engineer's duties on both locomotives are substantially the same, as both machines are under similar control.

A CAR has just been completed at Concord, N. H., which exemplifies what has heretofore been considered a chimerical idea of the novelist. It is cylindrical in form, just as the cars Jules Verne and others have told of have been. Its chief claim to fame lies in the fact that each section of the sides, with windows of curved glass, slides up under the roof, just as the curtain of the roll-top desk disappears as it is pushed upward. Just as the sides disappear a running board drops down just below the floor of the car, and in the usual position on the outside. In this way is the comfortable closed car transformed into a very neat appearing open car.

ON the French State railways it is stated that a number of passenger cars, in which all the parts were formerly manufactured from brass, copper and iron, with the exception of axles, wheels, bearings and springs, brake beams and couplings, are to be constructed of aluminum. The weight of a car provided with aluminum fittings is one and one-half tons less than that of the old coaches. As an ordinary train in France consists of twenty vehicles, the weight of the train would thus be reduced by thirty tons.

Practical Information.

Metallic Carbides.

Among the many new fields of work opened up by the introduction of the electric furnace, according to *Nature*, is the preparation of difficultly reducible metals undertaken with success by M. Moissan. These reductions being necessarily effected by the presence of carbon, the formation of definite metallic carbides of great stability soon becomes apparent, the properties of which came to be of such interest that their preparation was systematically attempted. Certain metals, such as gold, bismuth, lead and tin, do not form carbides at the temperature of the electric furnace, neither do they dissolve any carbon. The metals of the platinum group dissolve carbon with facility and deposit the whole of it, on cooling, in the form of graphite, the metals being unchanged. Copper, silver and iron take up carbon in quantities which, although small, are sufficient to cause marked changes in the physical properties of the metals. It is noteworthy that no definite crystalline compound could be obtained with iron. On the other hand, fused aluminum takes up carbon readily in the formation of the crystalline carbide, Al^4C^3, and the oxides of many other metals furnish similar crystalline compounds when heated in an electric furnace with an excess of carbon.

The behavior of these substances with water furnishes the most convenient mode of classification. The carbides of molybdenum, tungsten, titanium, zirconium—the latter having two—and of chromium—also having two—do not decompose water at the ordinary temperature. Of these reacting with water, the carbides of lithian, calcium, strontium and barium furnish a pure acetylene; of aluminum and beryllium, pure methane; of manganese, a mixture of equal volumes of hydrogen and lethane; while metals of the cerite group give crystalline carbides, all of which react with cold water, forming a complicated gaseous mixture containing hydrogen, acetylene, ethylene and methane. But the most complex reaction is that furnished by uranium carbide with water. In this case, in addition to the gaseous mixture containing methane, ethylene and hydrogen, liquid and solid hydrocarbons are produced in abundance. The carbides of silicon and titanium are extremely hard, the latter even cutting diamond.

A Rope From the Ocean.

The largest marine plant, and probably one of the highest plants known on this globe, is a gigantic seaweed, the nereocystis, the stem of which has been found to grow as much as 300 feet long. It was first discovered not far from the Alaskan coast, but has since been found floating in various parts of the Pacific ocean along the American and Asiatic shores. This seaweed grows in a very curious manner. Large quantities of it are found at a little distance from shore, and at depths not exceeding 300 feet. On loamy bottom large thickets of this plant take root, and a stem of the thickness of ordinary cord grows upward. At its top there is a pear-shaped balloon, which grows with the stem, and when it reaches the surface of the water it often measures 6 feet and more in length, with a diameter of 4 feet 6 inches. This balloon has, of course, an upward tendency, and keeps the stem growing until it floats on the surface of the water. From the top of this balloon a large tuft of strong, thick, spade-like leaves grows out, which originally are not more than 2 feet long, and which grow and split until from the balloon a roselike growth of from 50 to 65 feet in diameter covers the water. This gigantic weed grows in such quantities that near the shore large meadowlike islands are formed, which impede navigation. The natives of the Aleutian islands make manifold usage of this plant. From the strong dried stems they make rope 250 feet and more long, while balloons of this weed furnish them with large vessels after they are dried, the smaller ones being used in their boats to bail out water. The long leaves, after being dried, are cut into narrow strips and used for wickerwork, the making of baskets and similar furniture.

THE Utah pioneer farmers were the first to prove the advantages of irrigation in the arid regions. The increased products make bountiful returns for the extra labor involved, fully compensating for all trouble expended. There are no almanac farmers in Utah. While the farmer in the East is praying for rain or lamenting his fate because of the lack of it, the Utah yeoman is calm and serene as a June morning in Zion, going from headgate to headgate and turning on the water. There are about 380,000 acres of land under cultivation in Utah, of which 315,000 are actually irrigated. Out of the 11,200 farms, about 10,000 depend upon irrigation, the balance being dry farms (above the irrigating canals) or stock ranges or ranches. The average irrigated farm consists of about 30 acres. There are only seven irrigated farms in the State of 640 acres and upward.—Inter-Mountain Industries.

WOMEN are less sensitive to pain than men, and this sensitiveness is less in early life, increases to the twenty-fourth year, and decreases after that. The higher classes are most sensitive and degenerates the least. The latter are found very obtuse to the sensation of pain. Endurance of pain varies between much broader limits in women than in men, reaching a maximum far beyond the masculine limit, possibly due to great "suggestibility" of the female sex. "General sensibility" reaches the highest point in the nineteenth year.

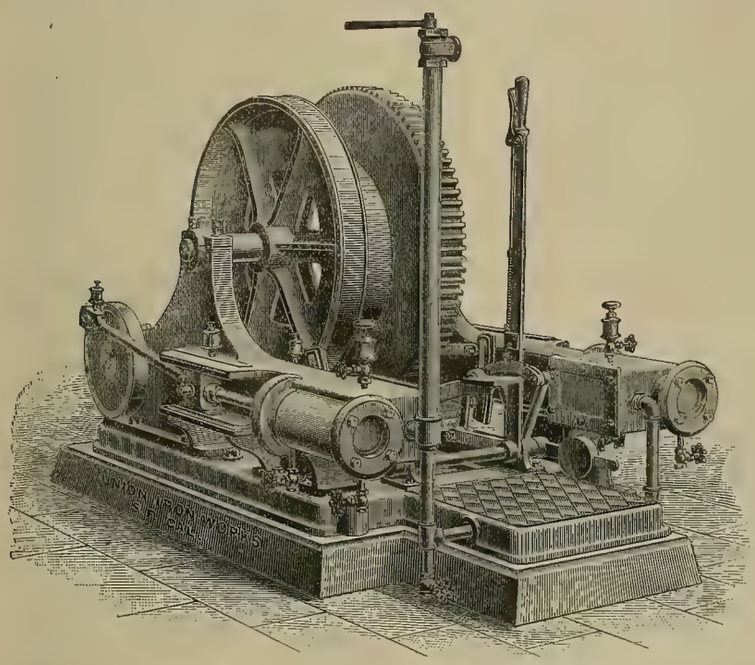
DURING 1896 British shipbuilders launched 1,326,822 tons, against 1,156,571 tons in 1895. Of that total the national dockyards turned out 71,970 tons, against 70,350 tons in 1895, and is the biggest output on record of the national workshops. Harland & Woolf of Belfast added 81,316 tons to the mercantile marine; at Newcastle Sir W. G. Armstrong & Co., 54,147 tons, with 67,770 i. h. p.; Sir William Gray & Co. of Hartlepool, 43,545 tons; and Connell & Co. of Scotstoun, 40,864 tons.

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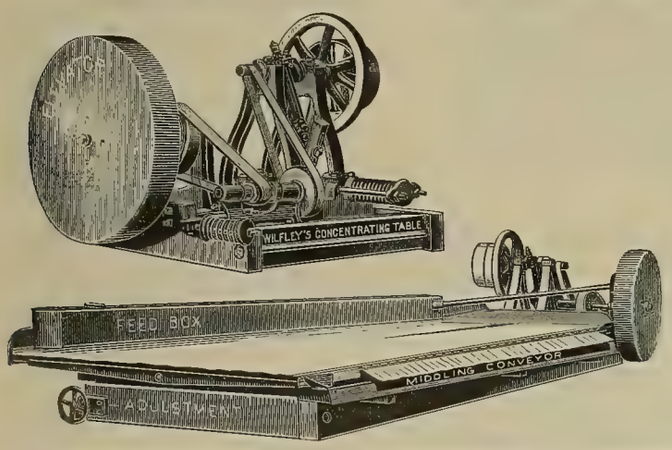
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The entire hoist is self-contained, being mounted on an iron sole plate or bed which carries all the operating levers and provides a footboard for the operator. The engines are provided with reversible link motion and the drum with a broad strap brake, insuring safe and rapid work.

The general lines upon which this hoist is designed are neat, strong and substantial and all the operating parts are conveniently arranged.

The size herewith illustrated is the 4 in. x 10 in., rated at 15 horse power. The larger sizes, 8 in. x 12 in. and upwards are provided with post brakes.



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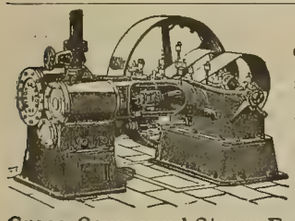
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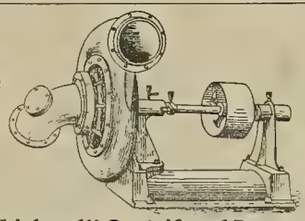
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For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Col.; M. E. Smith Concentrator, Golden, Col.; Mary Murphy Mine, St. Elmo, Col.; W. E. Renshaw, Mayflower Mill, Idaho Springs, Col.; W. H. Bellows, Boyd Mill, Boulder, Col.; H. E. Woods, Denver, Col.

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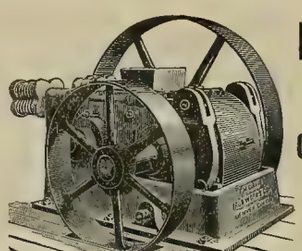
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Coast Industrial Notes.

—The Northern Pacific Coal Company is now shipping 1000 tons of coal a month to Rossland mines.

—At San Pedro harbor, Cal., borings into the bottom about the mouth of the inner harbor, and also about the outer harbor, are being made under orders of the Harbor Board.

—The Oregon Short Line & Utah Northern Railway property was sold to the reorganization committee last week at Salt Lake. The total sum bid at the three sales was $7,185,000.

—The Tutthill Water Wheel Company has been incorporated by S. J. and C. A. Tutthill, C. E. Chamberlain, C. S. Booth and E. B. Norton. The capital stock is $300,000, of which $100,020 has been subscribed.

—The three mills of the Puget Lumber Company have a combined daily capacity of 450,000 feet of lumber. The mill at Port Gamble, Wash., turns out an average of 225,000 feet daily, and has cut as high as 350,000 feet in a ten-hour run.

—The California Railway of Oakland has at last perfected the only first-class electric locomotive upon the Pacific Coast, which is now in operation between Oakland and the quarry. The locomotive will take a train of ten loaded cars over a 3 per cent grade.

—Preparations are being made by the S. F. & S. J. railroad people to begin work in the extension of their line beyond Fresno toward Bakersfield. The right of way has been secured and preparations are being made to grade and track 100 miles or more. In three or four weeks 300 or 400 men will be put to work on the extension, and it is expected to have the work finished by July 1st.

—From Oct. 6 to Dec. 17, '96—from a month before to a little over a month after election—the deposits of the national banks of Seattle and Tacoma and the four national and one private bank in Spokane increased 19 per cent. In October the total deposits of these six Seattle, five Spokane and two Tacoma banks were $4,336,973. On December 17th they were $5,147,356—an increase of $810,383.

—The Northern Pacific Railway Company has purchased the Cœur d'Alene Railway and Navigation Company's property, which was sold at auction under mortgage foreclosure by J. P. M. Richards, special master at Wallace, Idaho. The price paid was $220,000. It included the narrow-gauge railroad from Mission to Wallace and the line of steamers which ply between Mission and Cœur d'Alene City.

—Pennsylvania millmen project an iron and steel plant at Port Angeles, Wash., to cover thirty acres and cost $1,500,000. Stock is said to be taken up by workmen employed in mills located at Braddock, Duquesne, Homestead, McKeesport, Turtle Creek, Wilmerding, Pittsburg and Allegheny. The alleged intent is to employ 2000 men. The company is reported to have secured 600 acres of iron ore land and 1000 acres of coal land.

—Articles of incorporation have been filed in Wyoming of the Wyoming & Northwestern Railroad Company, which proposes building a line of railway westward from Casper through Natrona, Fremont and Uinta counties to the Wyoming line and thence to the Pacific coast by way of Salt Lake City. The capital stock is $6,000,000. The offices of the company are at Casper, New York and London. The incorporators are Englishmen named Thomas S. Moffatt, Reuben Hatch and Thomas J. Brown, the latter being the American agent of the British-American Exchange Association.

Recently Declared Mining Dividends.

Little Jessie, Arizona, $4000, payable January 14.

Anchoria-Leland, Colorado, $6000, payable January 15.

Le Roi, British Columbia, $25,000 payable January 15.

South Swansea, Tintic, Utah, $5000, payable January 11.

Whitewater Mining Co., Slocan, B. C., $24,000, payable January 5.

Silver King, Utah, $37,500, payable January 20. This is a total of $862,500 to date.

Galena, Deep Creek, Utah, $5000, payable January 11. This is a total of $71,000 to date.

There are seventy mining companies in the United States and British Columbia which paid an aggregate of $14,734,500 in dividends last year. The Calumet & Hecla, on Lake Superior, leads with $2,500,000, followed by the Anaconda with $2,225,000, the Boston & Montana $1,500,000, and the Quincy $1,000,000. Two paid $500,000 and $600,000, respectively, the other sums ranging from $1000 to $500,000.

On Jan. 11th the Calumet and Hecla Mining Company crossed the 100 mark by announcing a $5 regular dividend and $10 extra, the largest dividend ever declared in the history of the corporation at one time and the first extra. Both dividends are made payable Feb. 10th to stockholders of Jan. 13th, and together they call for the disbursement of $1,500,000, making an aggregate of $48,350,000 that the company has paid in dividends since it was organized.

Recent California Mining Incorporations.

Pioneer G. M. Co., San Francisco; capital stock, $100,000—$89,500 subscribed; W. M. Smith, C. Hohn, S. B. and F. B. Peterson, J. M. Hartman.

Shirlock Power and Mining Co., Mariposa; capital stock, $250,000—$200,000 subscribed; J. F. Hays, W. A. Stevers, W. H. Heitzig, M. E. and J. Green, of Fresno.

War Eagle M. & M. Co., San Francisco; capital stock, $100,000—$40,000 subscribed; B. W. Haines, R. Barnett, W. R. and J. H. Lewis, San Francisco.

Chowchilla G. M. Co., Oakland; capital stock, $1,000,000—$485,000 subscribed: D. M. Tomblin, B. W. Rogers, B. F. Hand, E. L. Knowlton, E. A. White.

Personal.

RANDALL HUNT of San Francisco has been appointed engineer of the Harbor Board which is investigating San Pedro and Santa Monica harbors.

SAMUEL CONNORS of Grass Valley, who has been in South Africa for a number of years and erected seven of the largest quartz mills there, has returned.

BARON DE MARIAS, a mining engineer, who has been sent out by the French Government to look into mining and milling properties in America, has been during the past week in Amador county.

H. R. Cocker, of St. Paul, Minn., succeeds Bernard MacDonald in the presidency of the American Mining and Development Co. of Butte, Montana, the latter having resigned to devote his exclusive attention to the position of consulting engineer of that company.

MR. B. HUNT, manager of the Brodie cyanide mill in Cripple Creek district, goes to San Francisco to take charge of the business of the Gold and Silver Extraction Company of America, in California, succeeding P. George Gow, who becomes manager for the Jumper Gold Syndicate of California. Paul R. Forbes becomes manager of the Brodie mill.

Obituary.

ALEXIS JANIN died in this city of heart disease last Wednesday. Few men have done as much for mining and metallurgy in the West as Alexis Janin and his brothers Louis and Henry. He was splendidly equipped by nature and education for his work. Mr. Janin was born in New Orleans in 1846. He was educated abroad, taking his first degree at Sorbonne, in Paris. Later he went to Freiberg, where the State examinations were taken by Mr. Janin and passed with so much credit as to entitle him to a professorship had he chosen to remain. His work on the Comstock in milling, and especially in working the ores and slimes, did much to make the methods there what they are. For more than twenty years past Mr. Janin had done nothing but special work for mines in Mexico, Central America and South America and the Western States and Territories. Having devoted more than twenty years of study to the amalgamation of ores, he probably knew more about that process than any other engineer. He was an accepted authority on all matters pertaining to ores and their working. It is to be regretted that he had not finished a work he was preparing before his death on working ores.

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It is a well-known fact that the richest and most famous gold mines in the known world are those of Colorado, many of which are paying to fortunate investors millions of dollars annually in dividends. Some shrewd persons who invested only a few dollars are now receiving hundreds and thousands in profits, and, judging from present indications, there are more desirable chances to invest just now than ever before. New mines are discovered daily and old ones strike richer veins of gold.

In order to meet the great demand for reliable information about mines and mining camps, one of Denver's oldest and best known publishers has just issued a handsomely illustrated book accurately describing every mining camp in the entire State of Colorado, giving scores of truthful photo-engravings of famous mines, mountains, cities, etc. Cripple Creek, the world's wonder, is fully described; also a correct map of the district. Narratives of how many poor people have become wealthy by judicious investments in gold mines, and sketches of former prospectors who are now fixed for life. Tells how to avoid unscrupulous brokers and sharpers. The volume has been carefully compiled by a disinterested author and every statement made is guaranteed to be true. All terms and phrases of miners fully explained; tables showing the State's production of gold and silver for 35 years past. The publisher will send by return mail a copy of the above great book upon receipt of 25c. (currency or stamps), which also includes a 3-months trial subscription to his big 56-column weekly family paper, the *Illustrated Weekly Sentinel* of Denver, Colorado (established 1-90). Clubs of 5 and 5 books, $1. The paper contains each week all the latest mining news and illustrations of Rocky mountain scenery, also true stories of love and adventure. Cut this out. Address as above and mention The Press when you write. It is reliable.

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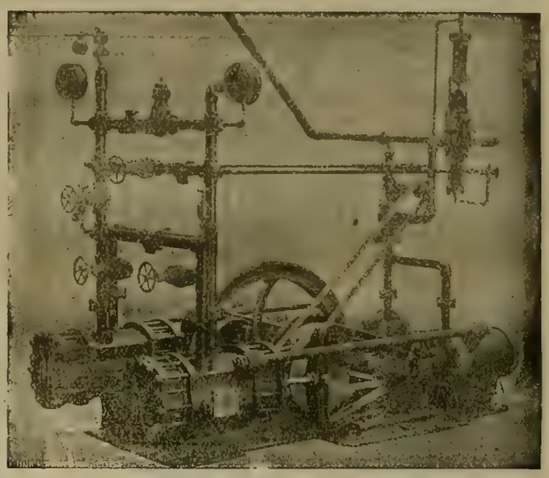
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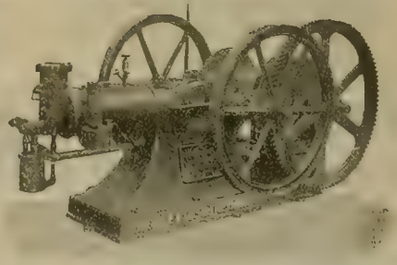
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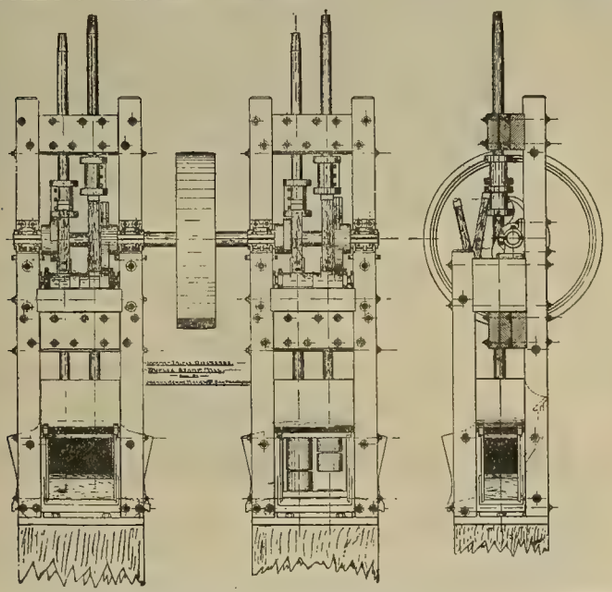
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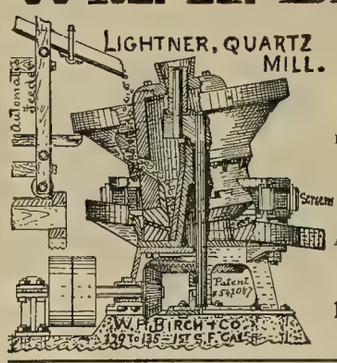
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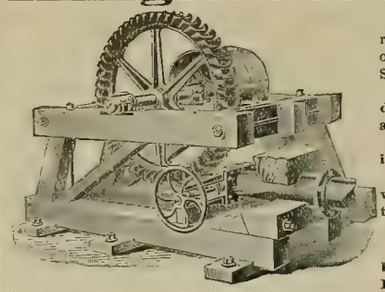
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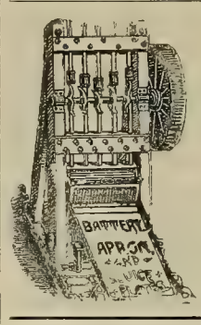
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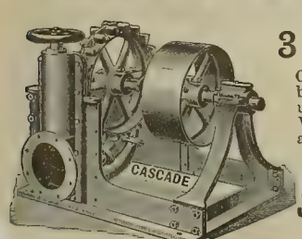
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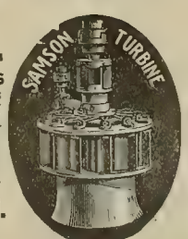
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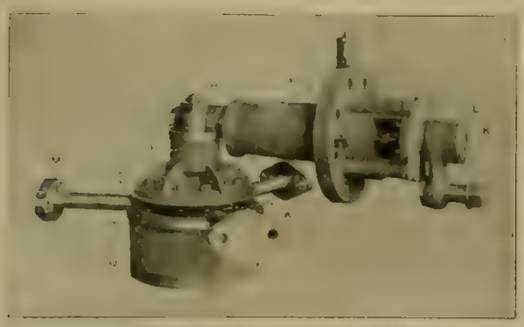
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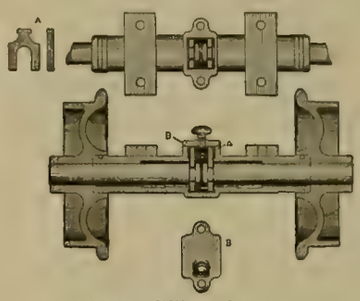
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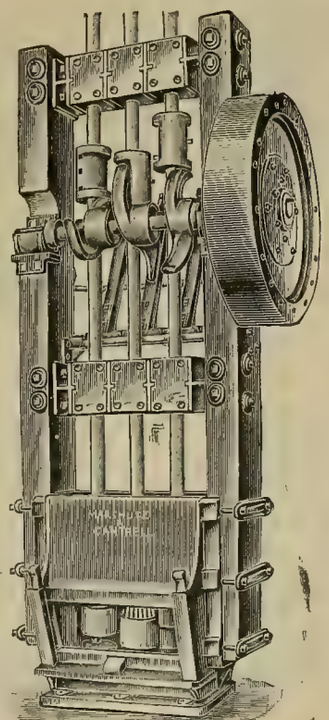
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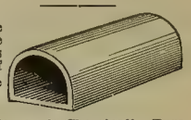
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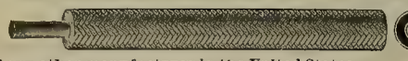
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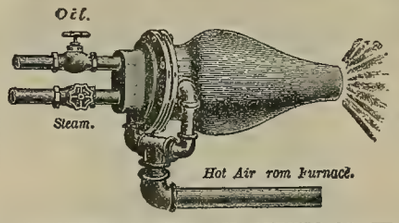
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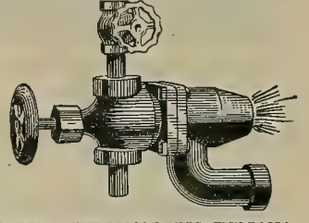
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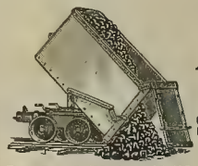
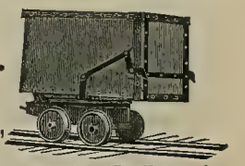
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Patented in U. S. and Other Countries. Capital, £100,000.
London Head Office.....8 Drapers Gardens.
Laboratory and Ore Testing Plant, 1530 Wynkoop St., Denver, Colo.

This process has a well-demonstrated merit in treatment of low-grade Gold and Silver Ores, especially those of a complex character, talcose and clayey combinations or slimes, which class of ore, as is well known, cannot be treated by leaching or lixiviation.
Gold and silver values, both fine and coarse particles, are by the PELATAN-CLERICI PROCESS recovered direct from ore without roasting as pure amalgam, and the precious metals are saved in the form of fine bullion without any refining costs.
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KENDALL GOLD AND SILVER EXTRACTION CO.
THE KENDALL PROCESS is the most efficient method of using cyanide for the extraction of precious metals from their ores. Wherever this process has been adopted the result has been increased percentages of values recovered and saving of time. Material reduction in consumption of chemicals has also been demonstrated with respect to several classes of ores.
All ores, without exception, amenable to cyanide treatment can be treated to better advantage by the Kendall Process. This can be accepted as an axiom.
The manager of one of the largest mines in the Mercur District, Utah, wires: "We now begin to understand dioxide process; last twenty days treated 220 tons per day of $26.50 ore, average of all tailings samples $0.83."
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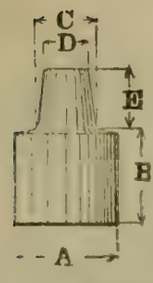

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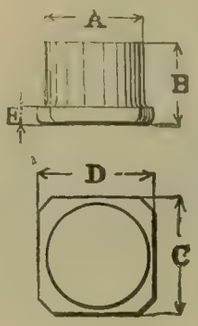
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These Shoes will outlast any other make and will not chip or cup.

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B=..... "
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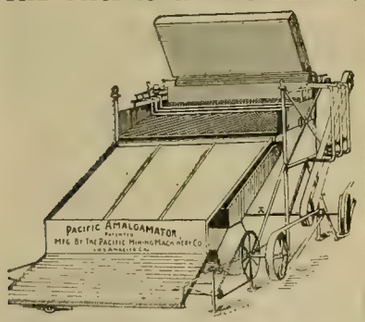
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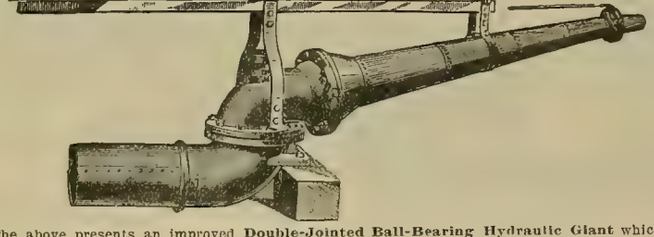
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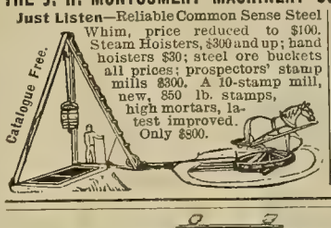
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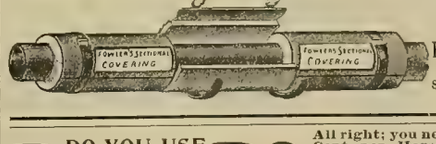
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Tintic Mining District, UTAH.

The Tintic Mining District lies eighty-five miles south of Salt Lake City on the Rio Grande Western Railway, and is, as shown by the records of 1895 and so far in the present year, the greatest mineral producing district in Utah.

The names of the great bonanzas of Tintic, the Mammoth, Centennial-Eureka, Bullion-Beck, Eureka Hill and Gemini are recognized everywhere that the mining industry is known. The four former have each a record exceeding $1,000,000 in dividends and the latter of over $600,000.

Until within the last two or three years no adequate means of reduction of Tintic ores was in operation in the district and the production of the mines was limited to those ores sufficiently rich to be shipped to the smelters for treatment, but this has been changed by the erection of immense combination and concentration milling plants which can work at a profit those immense deposits of low grade ores which fill all the producing mines of the district. Four of these mills are in active operation, and three others will undoubtedly be erected within the next year.

The ores of Tintic are greatly diversified in character. The principal metals produced are gold, silver, copper and lead. In silver production Tintic leads the State, while in the production of gold it stands second on the list. Beside the big bonanzas above mentioned there are some twenty-five or more properties that now and in the past have been producing mines, and to these may be added a score of others which have paid for their development by their products, and upon which the recent rivival of the mining industry has had the effect of a recommencement of operations.

Tintic has four thriving towns—Eureka, the business center of the district, with a population of 2,500; Mammoth, population 1,000; Robinson and Silver City, 500 each, all of which offer great inducements for investments in a business way.

At the base of the foot hills only a few miles away, is a valley of 25,000 acres of choice fruit and garden lands, watered by the Mt. Nebo Land and Irrigation Company.

As to the future of Tintic, it is no exaggeration to say that it possesses the brightest prospects of any mining district in Utah, and offers to the prospective inventor opportunities which cannot be excelled.

The Rio Grande Western Railway has a double daily train service between Salt Lake City and the Tintic Mining District. For further particulars apply to F. A. WADLEIGH, General Passenger Agent, Salt Lake City.



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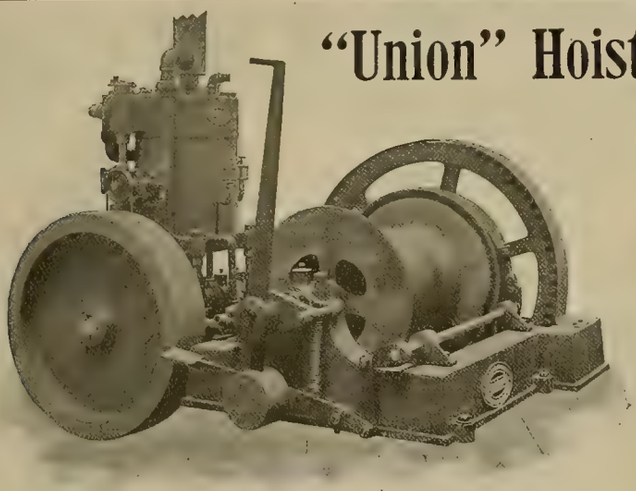
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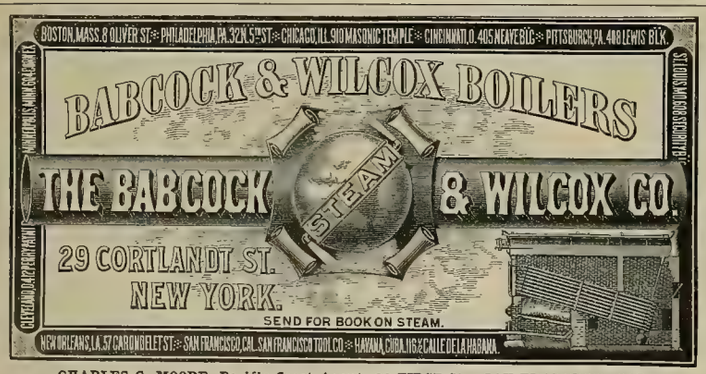
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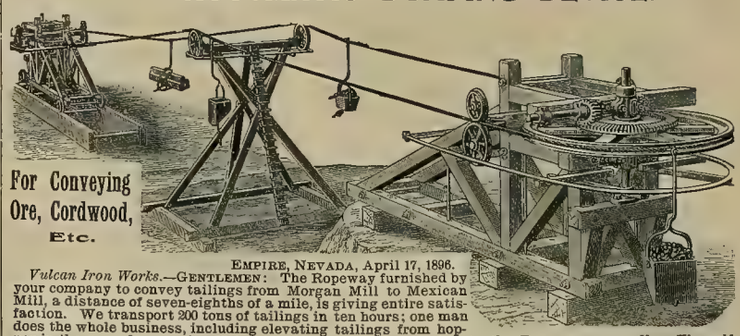
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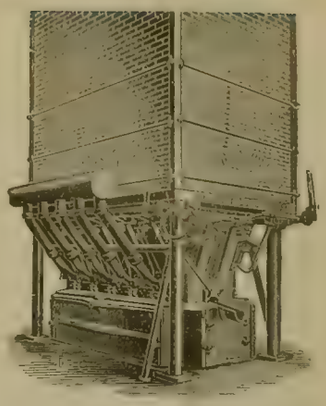
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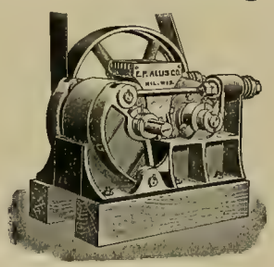
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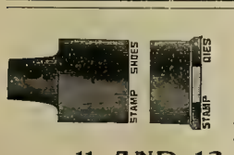
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Market Reports.

The Markets.

SAN FRANCISCO, Jan. 14, 1897.

General trade is steadily improving. Compared with the corresponding time last year, it shows a larger volume of goods going out. This, no doubt, is due to the small stocks carried by the trade with assortments badly broken, which call for filling in. The tariff question continues a disturbing factor, which is being severely felt in quite a number of lines. Iron workers report the outlook more promising than for years; but close competition with the East reduces the margin of profit. It is the belief that there will be a free demand for structural material for building bridge construction and other purposes. The promise of large crops will create a demand for agricultural implements, while renewed activity in mining will create a good demand for mining machinery.

The local money market is very dull, with funds steadily increasing in the absence of a demand and disbursed money coming back for investment. The heavy disbursements being made for export products unties large sums of money each week. The export clearances of products and general merchandise average about $900,000 a week. This is an important item and has weight in local finances and exchange market. The East continues to report a plethora of funds with the reserve largely increased. Money is offered in New York at the rate of 1½ per cent a year on Call loans. A leading New York financial paper just to hand says: The trade balance in favor of this country amounts to over $300,000,000, which represents a very handsome sum to the credit of the United States, even after allowing for freight and other items which have to be deducted. The mines in this country are yielding over $46,000,000 of gold and $36,000,000 of silver, with the gold production increasing at the rate of about $7,000,000 a year. The country is getting good prices for wheat, with a market for the exportable surplus and there is an immense crop of corn awaiting movement. Liquidation has been thorough and it is to be hoped that wiser methods of legislation will prevail.

New York Silver Prices.

NEW YORK, Jan. 14.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	29 11-16	64¾
Saturday	29 11-16	64¾
Monday	29 11-16	64¾
Tuesday	29 11-16	64¾
Wednesday	29 11-16	64¾
Thursday	29 11-16	64¾

	Copper.	Lead.	Iron.	Tin.
Friday	11 50	3 02½	11 00@13 00	13 05
Saturday	11 55	3 02½	11 00@13 00	13 10
Monday	11 60	3 02½	11 00@13 00	13 10
Tuesday	11 65	3 02½	11 00@13 00	13 10
Wednesday	11 67½	3 02½	11 00@13 00	13 10

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	12½c Prem
New York Telegraphic Transfer	15c Prem
London Bankers' 60 days	£4.85½
London Merchants	£4.84½
London Sight Bankers	£4.88¼
Refined Silver, per oz., 1000 fine	64¾
Mexican Dollars	51¾@52¼

SILVER.—The market has held to steady prices throughout the week. Our advices from the East are to the effect that the export movement is quite free, with the outlook favorable for an increase instead of a decrease after the year had been well entered. Improving business abroad is a factor in its favor.

MEXICAN DOLLARS.—The market is steady at the reduced quotations. The inquiry from China is said to be fairly good.

ANTIMONY.—Our market is quoted at 7½@8c in a jobbing way. New York mail advices quote 7¼c for Cookson's, 6¼@6¾c for Hallett's and 6½c for Japanese.

QUICKSILVER.—The year opens with a fair call for the season.

The market is quoted as follows:

Domestic trade, per flask	$6 40

For export, quotations are nominal but less than for home.

COPPER.—As stated by the MINING AND SCIENTIFIC PRESS would be the case, the markets at the East and abroad are strong and higher. The stocks are not large, while the consumption is steadily increasing.

CURRENT COPPER STATISTICS.

In their copper circular of the 7th inst. D. Houston & Co. of New York say: There has been a gradual transition of the market from a condition of previous dullness to one of great interest and positive strength. Since the latter part of December prices have advanced from about 11¼ to the present quotation of 11⅝ to 11¾ for Lake Superior copper. During the past month a leading Lake company sold considerable copper at 11½, and another producer sold a round lot last week at 11¼ for January delivery. Inquiries have increased lately, but holders have been reluctant to accept further recent orders at 11⅝, and the trend of values is in an upward direction. There is every indication that the market is now at bottom, and the new year opens with a much stronger feeling and increasingly hopeful expectations in copper circles regarding this metal. The very best of reasons for the improved features is found in the relation which the important factors of supply and demand at present sustain to the market. They are so happily adjusted that they cannot fail to exert any other than a favorable influence. Complete returns of production will not be ready before the middle of the present month, but taking the output for the first eleven months of the year, and estimating the December product at the same average, the total copper production for 1896 would appear as follows:

	Tons.
United States production, January 1 to November 30, 1896	186,275
United States production, December, 1896 (estimated)	16,934
Total for 1896 in fine copper	203,209

	Tons.
United States exports of copper, January 1 to November 30, 1896, per Copper Association's returns	112,625
United States exports of copper, December, 1896, per metal Exchange returns	13,288
Total exports, 1896	125,913
For home consumption	77,296

Stocks carried over January 1, 1896, must also have been drawn upon, so that domestic consumption was probably larger than represented by the above figures.

The enormous exports the past year are without parallel in the whole history of copper and comprise about 61 per cent of the total United States production for 1896. Although American production will show an approximate increase of 32,142 tons during last year, or about 18¾ per cent over previous year, exports increased about 94½ per cent compared with 1895. The exports of copper from this country for 1896 are equivalent to the entire annual production last year of the Anaconda, Calumet & Hecla, Boston & Montana mines, and possibly the Quincy mine also. Domestic consumption last year was much below normal figures, owing to adverse business conditions, but with the home demand up to the full limit of its natural volume is it not probable that the supply of copper would be altogether inadequate to the world's needs, notwithstanding the maximum production attained in 1896?

Current production has not only been well absorbed, but stocks have undergone serious depletion during the past twelve months. The year 1897 opens with brightening prospects for American manufacturers, and its advent finds them preparing for trade on a much larger scale. With the expansion of business there should be a constantly growing demand for copper, both in this country and Europe, to meet the extended introduction of electrical projects and the more extensive use of this metal for other purposes. Diminished stocks will have to be replenished, and with the anticipation of reasonably higher prices between now and spring, the necessity and incentive for purchasing will no doubt operate to produce much greater activity. Indications on the horizon foreshadow the return of much better times for copper and copper mining shares, and the peculiarly excellent position of the metal certainly furnishes a solid basis for a vigorous and active movement in both.

The foreign situation on copper is remarkably strong. The demand throughout Europe has grown wonderfully the past year and the prospect for its continuance is excellent. Notwithstanding the enormous imports of copper into Europe, deliveries have exceeded the total supplies going forward, and European visible supply of copper January 1, 1897, was 10,890 tons less than on January 1, 1896, and 19,783 tons less than on January 1, 1895.

Consumption of copper in England from January 1 to December 1, 1896, according to carefully prepared estimates, was at the rate of 7306 tons per month, and exceeded the total European production during the same period by 1683 tons. The increase in British consumption of copper during the first eleven months of last year was at the rate of 40 per cent compared with that of 1895. German consumption had increased up to last returns 35 per cent, and that of France 24 per cent. The consumption in these three countries is estimated at the rate of 394,007,040 pounds per annum, or an increase of 103,000,000 pounds over 1895. In addition thereto, there was exported to other European countries from the United States, during the first ten months of 1896, a total of 91,032,515 pounds of fine copper, or 41,379,676 pounds more than was shipped during the corresponding period in 1895 for the same destination. The position of copper in Europe and the unprecedented foreign demand is altogether phenomenal. Stocks of Chili copper in Liverpool and Swansea have been reduced 15,647 tons during the past year.

The Anaconda Copper Mining Co. has issued its first annual report for the fiscal year ending June 30, 1896. It is an interesting document, and the exhibit presented by its balance sheet reveals the gigantic character of this famous property. The report states that during the year 107,036,697 pounds of fine copper were shipped from Anaconda in the form of electrolytic bars, anodes, or converter bars. The sales during the same period amounted to 85,476,795 pounds of fine copper, 4,498,560 ounces of silver and 14,384 fine ounces of gold. An analysis of the report brings out the fact of the high cost to the company of its copper product, and that the profits accrue principally, if not entirely, from the precious metals and subsidiary departments. Items of expenditures give a good idea of the cost of the copper produced by the Anaconda, and summarizing the report of the company, the copper itself may be set down as a by product. In round numbers the accounts show a profit of about $4,000,000 as a result of the operations of the company for the year. This is equivalent to a profit of $3 13-100 per ton of ore. The electrolytic refining plant at Anaconda has been doubled, and has now a capacity, when worked up to the full limit of 6,000,000 pounds of copper per month. The initial report of this celebrated mine certainly furnishes ample ground for anticipating higher prices for copper. The shares are now quoted in London at £6 2s 6d.

Rio Tinto Company, limited, have taken steps to divide the existing 325,000 shares of £10 each in the company's capital into two shares of £5 each, to be called preference shares and ordinary shares. The proposition was unanimously agreed to last month, and the division is to be made on the 15th of May, 1897, but the net profits of the company earned on or after January 1 are to be appropriated as if such division had taken place on that date. Since the new regime the shares touched £26 and now quote £25 17s 6d.

The Calumet & Hecla Mining Co. shares have advanced to the highest price ever recorded, and sold on the 6th inst. at $345.

The Franklin Mining Co's. production of copper for the year 1896 is (including the estimate for December) 2,747,861 pounds. There was no product in January, 1896, owing to the fire.

The latest advices from the Franklin Junior are: The big crosscut is going on very well and good progress is made. At the Kearsarge shaft a depth of 50 feet from the surface has been reached, the lode showing copper occasionally. At the Pewabic lode, the drift south shows fairly well in copper. The north drift in this level is now very good, and a good deal of high-grade stamp rock is in sight. The shaft is below the sixth level and is showing quite well. The prospect in this shaft is quite encouraging. In November last 604 tons of rock taken from workings on the Pewabic lode were stamped, and yielded 20,555 pounds of mineral, equal to 1 7-10 per cent.

The production of the Quincy Mining Co. for the year 1896 will be about 16,750,000 pounds fine copper, against 16,304,721 pounds in 1895.

The local market is quoted as follows:

Ingot, jobbing	14¼@—
Ingot, wholesale	13½@—
Sheet copper	17 @—
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17c
Lake Superior Sheathing	20

LEAD.—The market is practically unchanged. The East reports that the demand is not active, while offerings are not free.

Pig	—	@	3 75
Bar	—	@	4 00
Sheet	—	@	5 25
Pipe	—	@	4 50

SHOT.—There is a moderate demand.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 20
Drop, B and larger sizes, " " "	1 45
Buck, Balls and Chilled, do, " " "	1 45

BORAX.—Shipments to the East are fair. The market is steady.

The market is quoted as follows:

Refined, in car lots	5
Refined, in sacks	4¾
Powdered, in car lots	4½
Concentrated, "	5

IRON.—The market is unsettled. While lower prices are not quoted yet, it is known that concessions can be secured. The East reports weak markets, with prices for pig more or less unsettled.

COAL.—The market continues in sellers' favor. The low charters at this port for deep-sea vessels will operate against Australia shipments here for two or three months.

TIN.—The market is firmer in sympathy with the East, where slightly higher prices prevail.

Pig, per lb	14¼c@ —
Plate, I C coke, heavy, per box	— @$4 05
" " " light, " "	— @ 3 95

POWDER.—The demand is fair.

The market is quoted as follows:

Hercules, No. 1*, per pound	11½c
" No. 2, " "	8½c

Mining Share Market.

SAN FRANCISCO, Jan. 14, 1897.

The market has been irregularly active the past week, with dealing chiefly in Gold Hill shares under the lead of Challenge. The outside public are slow in taking hold, confining transactions to chippers and room traders. Without new blood can be gotten into the game, it looks very much as if lower prices will rule. It is barely possible that two or more outside pools may combine and bull the market so as to try and unload at higher prices. If they do this it will prove a failure unless more ore is shown up than has been for many months past. Victims are getting quite scarce, and those now willing to be bled have comparatively little money; but it may be that the market is being worked in the interest of a strong combine that wants shares and not money. If this is so, then it will be a freeze-out game, plenty of promises, very little ore, but plenty of assessments. It is asserted that if it were desired to show up considerable ore it could be done at several places. It is stated that in Alpha this can be done whenever desired. Over twenty years ago Con. Imperial paid dividends from ore extracted from the Red or West lode, and nine years ago Confidence did the same thing. Now that Alpha has struck the lode it can do likewise. It looks very much as if the powers that be do not wish to uncover the ore, which, if so, gives color to the belief in certain well-informed quarters that it is shares that is wanted. Experience has taught that when considerable ore was shown up the public would come in as buyers and not as sellers. With the promise of ore, but not carried out, followed by assessments and a low, dragging market, outsiders have been made to let go their holdings. After securing all the shares desired, a good-sized deal was engineered on a bona fide development of ore found years before, but kept in the background for an opportune time. On the ore showing, insiders

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied.	Delinq't and Sale.	Secretary.
Alta S M Co, Nev	54	5c	Dec 14	Jan 18..Feb 8	J E Jacobus, 309 Montgomery
Anita G M Co, Cal	12	5c	Dec 21	Feb 1..Feb 18	L F Reichling, 404 Montgomery
Bullion Con G M Co, Cal	10	10c	Nov 30	Jan 11..Feb 10	C A Grow, Mills Bldg
Con Cal & Va M Co, Nev	7	25c	Dec 8	Jan 14..Feb 4	A W Havens, 309 Montgomery
Crown Point G & S M Co, Nev	69	10c	Dec 9	Jan 13..Feb 3	Jas Newlands, Mills Bldg
Eureka Con Drift M Co	5	5c	Nov 24	Dec 28..Jan 18	D M Kent, 330 Pine
Exchequer M Co	39	5c	Nov 14	Dec 17..Jan 11	Chas E Elliott, Nevada Block
Gould & Curry S M Co, Nev	80	15c	Dec 14	Jan 19..Feb 9	A K Durbrow, 309 Montgomery
Hale&Norcross S M Co, Nev	110	25c	Dec 8	Jan 11..Feb 1	R U Collins, 331 Pine
Hartmann Mining Co, Cal	1	5c	Dec 22	Feb 1..Feb 23	G W Peer, 4 Montgomery
Horsefly G M Co	1	25c	Nov 4	Dec 21..Jan 20	R T Ward, 610 Clay
Jamison M Co	9	5c	Nov 27	Jan 25..Mar 22	Sam W Cheyney, 120 Sutter
Mineral Hill M & S Co, Cal	1	5c	Jan 4	Feb 15..Mar 25	Chas Peach, 210 Sansome
Occidental Con M Co	25	15c	Nov 24	Dec 29..Jan 18	A K Durbrow, 309 Montgomery
Overman S M Co	76	10c	Nov 28	Dec 31..Jan 22	Geo D Edwards, 414 California
Thorpe M Co, Cal	4	5c	Oct 14	Dec 22..Jan 9	A F Frey, 567 Market
Ybarra G M Co, Lower Cal	6	10c	Dec 4	Jan 6..Jan 25	Jas Coffin, 132 Market
Reward G M Co, Cal	17	3c	Dec 19	Jan 20..Feb 5	S W Backus, Mills Building

ANNUAL MEETINGS.

Company and Location.	Secretary and Office in S. F.	Date.
Brunswick Con G M Co, Cal	J Stadtfeld, 309 Montgomery	Jan 14
Bullion M Co, Nev	R R Grayson, 331 Pine	Jan 14
Silver King M Co, Nev	J W Pew, 310 Pine	Jan 12

WILL NEGOTIATE with owners or their duly authorized agents only.

WILL INVESTIGATE only thoroughly bona-fide properties, either Mines, Prospects or Mineral Lands, whose owners are willing to make reasonable terms. When sending reports on properties also send terms on which you are willing to sell or lease.

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Mining Stocks, Bonds, Options, Leases, Contracts and Securities.
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WILL EXAMINE on reasonable terms all kinds of Mines, Mining Properties and Mineral Lands as to their value, method of working and the condition of their titles.
WILL GIVE Options, Leases, Bonds and Contracts on all kinds of Mines, Mining Properties and Mineral Lands.
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succeeded in unloading at around the highest prices of the deal. This has been the history of the Comstock mining share market and will continue to be so long as outsiders can be induced to play at the game. It cannot be denied that considerable work is being done in the mines, considering the small number of miners employed, but it seems that the work is driven to within a short distance of where ore can be found, when it is either stopped or turned to one side.

From the Brunswick lode there come reports of streaks of high-grade ore being cut in Occidental. If these should widen it will create renewed interest in the shares of that mine. In Chollar they are preparing to open up the 500-foot level. They are extracting six to seven tons of ore a day from the work on the 400-foot, 300-foot, 200-foot levels They milled 232 tons of ore which returned $7,884 60 in gold and four bars of fine silver weighing 3823 ounces. This gives a yield of nearly $43 to the ton, which ought to more than pay expenses of the company. All work has been discontinued by Con. Virginia, Best & Belcher and Gould & Curry in the tunnel so as to confine operations to the 800-foot level which is 120 feet deeper than the tunnel level. The south drift on this level is being run jointly by Best & Be cher and Gould & Curry. The material passed through is reported to have been quite favorable.

Interest in the Comstock mines centers in the work that is being done in the Gold Hill groups; but, as yet, official letters do not warrant any excitement. In Alta the work continues of a kill-time character and how not to strike ore. In Overman they raise about one ton of ore a day, but the grade is higher, which is some comfort to assessment payers. Official letters from Belcher and Seg. Belcher are still silent as to where work is being done. A few tons of ore are being raised. Work has been resumed in Yellow Jacket, but on what level and in what direction we are not able to learn. It may be that it is towards Challenge, and that it is to this that the strength in the Challenge shares is due. A few tons of ore are raised each week by Confidence. Work is progressing more rapidly in the Challenge-Confidence-Con. Imperial joint west crossdrift. It is confidently asserted that this crossdrift will strike quite a body of ore, mostly gold, before thirty days pass. In Alpha they report low-grade quartz to the west. This causes many to believe they are not ready to show up the high-grade ore known to be near where they are said to be working. Work has been resumed in Bullion. It is said that when the long west crossdrift was stopped the general formation of the ground had improved very much for the better. In Potosi and Chollar no work is being done. In Hale & Norcross they are raising from the 900-foot level. A few tons of fair-grade ore were extracted. In Savage they are working on the 500-foot, 750-foot and 850-foot levels. A few tons of ore were saved last week. Work is continued by Best & Belcher and Gould & Curry on their joint east crossdrift. In Con. Virginia they are still exploiting the 1000-foot, 1650-foot and 1750-foot levels. Nothing of special interest has been developed by the work. In Ophir they are still killing time on the central tunnel and 1000-foot level. In Mexican work is confined to the 2000-foot level towards the west. In Union, Sierra Nevada, Utah and Andes the work is the same as has been heretofore reported.

The following illustrates the changes of the week:

MINES.	Jan. 7.	Jan. 14.
Alpha	$ 17	
Alta Consolidated	04	$ 08
Andes	16	
Belcher	51	45
Best & Belcher	54	55
Bodie		
Bullion	07	
Challenge	64	57
Chollar	76	84
Confidence	1 45	1 30
Consolidated California and Virginia	1 05	1 30
Consolidated New York		
Crown Point	28	35
Exchequer		
Gould & Curry	27	42
Hale & Norcross		
Justice		
Mexican	45	41
Ophir	1 00	95
Overman		13
Potosi	55	53
Savage	27	24
Sierra Nevada	47	44
Union	44	43
Utah	04	
Yellow Jacket	40	34

San Francisco Stock Board Sales.

SAN FRANCISCO, January 14, 1897.

9:30 A. M. SESSION.

700 Belcher	45	400 Ophir	92
500 Best & Belcher	53	500 Overman	13
200 Caledonia	11	400 Potosi	53
300 Challenge	51	100 Savage	21
300 Chollar	74	100 Standard	1 55
10 Con Cal & Va	1 25	100 Union	38
600 Gould & Curry	42	100 Yellow Jacket	34
100 Mexican	41		

SECOND SESSION—2:30 P. M.

600 Ophir	95	300 Con Imperial	02
500 Gould & Curry	42	100 Confidence	1 30
200 Best & Belcher	55	200 Sierra Nevada	44
200 Con Cal & Va	1 30	200 Overman	15
100 Savage	24	200 Alta	08
300 Chollar	84	100 Challenge	57
100 Crown Point	35	150 N. G. & C	23

DIVIDEND NOTICE.

The German Savings and Loan Society,

526 California Street.

For the half year ending December 31, 1896, a dividend has been declared at the rate of four and twenty-six hundredths (4 26-100) per cent per annum on Term deposits and three and fifty-five hundredths (3 55-100) per cent per annum on Ordinary deposits, free of taxes, payable on and after Saturday, January 2, 1897. GEO. TOURNY, Secretary.

Rainfall and Temperature.

The following data for the week ending 5 A. M., January 13, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS	Total Rainfall for the Week.	Total Seasonal Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date	Average Seasonal Rainfall to Date.	Maximum Temperature for the Week.	Minimum Temperature for the Week.
Eureka	.44	23.04	15.90	19 94	58	38
Red Bluff	.12	11 35	6.66	12 58	66	34
Sacramento						
San Francisco		11.10	4 10	11.25	60	40
Fresno	.06	4.01	1.11	2 64	58	30
San Luis Obispo	.22	7.01	4 00		74	36
Los Angeles	.27	5.46	1.71	10.28	78	48
San Diego	.04	3.88	1.57	4 42	72	48
Yuma	.54	2.40	.32	1 83	70	38

Commercial Paragraphs.

THE management of the Dixon Drill Company at Denver, Col., are increasing their facilities for manufacturing the machine. They feel that they have reached a degree of proficiency in the machine which fully warrants this.

MCFARLANE & Co. of Denver and Central City, Col., are building two mills in Arizona—one of ten stamps near Nogales for the World's Fair Mining Company and the other of forty stamps near Kingman for the Excelsior Mining Company. Both are of the pan-amalgamation type.

THE Edward P. Allis Company of Milwaukee, Wis., has recently shipped considerable machinery to South Africa—three cross-compound direct-connected engines of 1000 H. P. each, to be used for electric power to drive pumps and hoists. Each engine weighs 100 tons. The Allis Company will shortly make further shipment to South Africa of three direct-acting hoisting engines weighing 200 tons apiece.

The Wilfley Concentrating Table.

The Wilfley Concentrating Table, a cut of which may be found in the advertisement of the Mine and Smelter Supply Company of Denver, consists of a flat table, 7x16 feet, resting on rollers, and is operated by an eccentric, giving a jerking motion, which carries heavy material to bottom of bed, then forward to head end of table. The pulp is fed through a feed box extending from end to end. This box is divided in such a way as to feed pulp at one end and clean water at end where concentrates pass off, resulting in a clean heading, so that operator can see at a glance what table is doing. Another good feature of this mode of feeding is that all material is kept continually under water and never exposed to the air. A simple experiment may be made with ores to show result of exposure to air. Take some pulp and pan it down until you can string the concentrates out, then tip pan back until these are exposed to air a few seconds, then bring water up on them slowly; the result with most ores which carry any copper, and often with iron and galena ores, is that a quantity will come to surface of water, and this is usually very rich material. It is nearly always stated that these are slimes, but it is not the case, as a screen will readily show, and careful consideration will convince any mill man that with belt, bumping, or in fact any table but the Wilfley, the losses in a day must be very serious. Of the Wilfley it may be said that all this material is easily saved. The silica passes across table (it being slightly inclined) and off at the side, in doing which it passes over cleats which are about ½ inch at tail end of table and taper to a point toward head end, the result being that coarse silica passes off first; then as material is jerked forward and upward upper end fine silica rises to surface and is carried off next. In this way the table acts as a sizer to a certain extent. If ore is put on a table or into any receptacle and thoroughly shaken, the coarse and fine concentrates and fine silica will go to the bottom, and the difficulty experienced in concentrating is to remove fine silica without large losses, hence a large percentage of silica accompanying concentrates is usually fine.

THE OVERLAND LIMITED, VIA UNION PACIFIC.

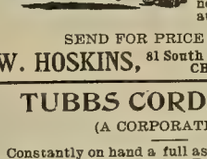
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Assessment Notices.

GOULD & CURRY SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California. location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Trustees, held on the 14th day of December, 1896, an assessment (No. 80) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 69, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 19th day of January, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on TUESDAY, the 9th day of February, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Trustees.

ALFRED K. DURBROW, Secretary.

Office—Room 69, Nevada Block, 309 Montgomery St., San Francisco, California.

HARTMANN MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Chili Gulch Mining District, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 22nd day of December, 1896, an assessment (No. 1) of 5 cents per share was levied upon the issued capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 46, No. 4 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of February, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 23d day of February, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

G. W. PEER, Secretary.

Office—Room 46, No. 4 Montgomery street, San Francisco, California.

MINERAL HILL MINING AND SMELTING CO.—Location of principal place of business, San Francisco. California; location of works, Spenceville, Nevada County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 4th day of January, 1897, an assessment (No. 1) of five cents (5c) per share was levied upon the whole of the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 210 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of February, 1897, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 25th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. PEACH, Secretary.

Office—210 Sansome street, San Francisco, California. Office hours from 1 to 3 o'clock P. M.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from S. J. Hoisington, in the Drummondsville mine, near Forest Home, Amador county, to deposit tailings in Drummondsville creek; and from G. D. Duncan & Co., in the Pebble Bottom mine, near Yankee Jim's, Placer county, to deposit tailings in a ravine, gives notice that a meeting will be held at Room 69, Flood Building, San Francisco, Cal., on January 25, 1897, at 1:30 P. M.

British Columbia.

W. J. R. COWELL, B.A., F.G.S., Mining Engineer,

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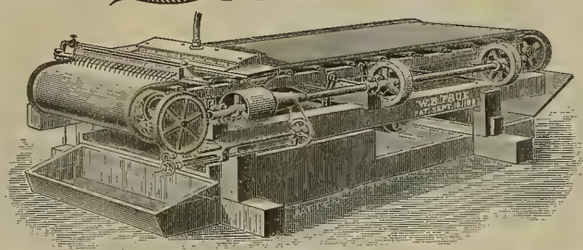
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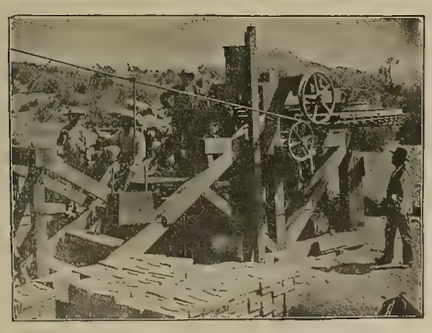
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No. 1907.—VOLUME LXXIV. Number 4. SAN FRANCISCO, SATURDAY, JANUARY 23, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Smuggler-Union Mine, Telluride, Colo.

Herewith is illustrated Pandora, Colo., the lower terminal of a tramway from the Smuggler-Union, claimed to be the biggest silver-gold mine in the State of Colorado, for which we are indebted to the courtesy of that enterprising paper, the Telluride, Colo., *Journal*. A remarkable feature of the Smuggler-Union is the continuity and regularity of its vein, which from Canyon Creek, Ouray Co., cuts southeasterly through a mountainous country a distance of four miles into San Miguel Co., and is reported to carry pay ore for 1½ miles, the vein being two to ten feet in width.

A remarkable feature, as noted by the Journal, is the constant increase in gold values toward the south from the summit of the divide, and the corresponding decrease in silver value in the same direction. Where the vein crosses the divide at the extreme north end of the property, the gold value is hardly one-quarter that of the silver. The transition from silver to gold is almost constant until a mile south the vein practically becomes a gold lode.

The surface and underground development of the property would, in a straight line, cover twenty-three miles. The levels, 100 feet apart, are timbered with stulls, upon which lagging to support the waste produced in stoping is placed. The stull timbers are set into foot and hanging wall at right angle to the dip, and are about 14 feet long and as many inches in diameter. The work of exploitation is carried on by stripping in country rock on the hanging wall to a height of 7 feet, and then shooting down the vein in mass to be broken up and passed into chutes with little or no sorting. The mill is located at Pandora, connected with the mine workings by a tramway and by sidetrack with the Rio Grande Southern R. R. There are 50 stamps, 800 pounds, that drop 9 inches, 95 drops per minute.

In 1896 60,075 tons of milling ore and 6,255 tons of shipping ore were carried, and there has been taken up to the mine 17,685 mill timbers, 3,852,150 pounds coal and 16,276,158 pounds merchandise of all kinds.

The gross output for 1895 was 46,654 tons; for 1896, 65,575 tons. Three hundred and ten men are carried on the company's pay roll.

A long article on page 461 of the MINING AND SCIENTIFIC PRESS of Dec. 5th, 1896, gives so extended an account of this mine, its geology, etc., as to render unnecessary any further reference to it.



PANDORA AND LOWER TERMINAL OF SMUGGLER-UNION TRAMWAY.

Why Mines Offered Are Not Sold.

A great many of those who have mines to sell in this country claim that it is not true that there is much capital seeking investment in that direction. Yet there is a demand for all the mines that are offered in proper shape and at reasonable prices. The great trouble with those who have mines to sell—both owners and promoters—is that they do not have their properties opened up to show whether they are of real value or not; or, if they do, do not have them properly examined and sampled so as to give prospective purchasers some guarantee that they are more than mere prospects. This is especially noticeable in California, where as much is often asked for a prospect as for a developed mine, simply because the prospect is well located. They do not appreciate the fact that mining is being conducted on a more business-like basis than it was a decade ago.

A very small amount of work in developing will often make a showing that will enable a mine owner to ask enough to repay him many times over. True, a little work will often spoil a very good prospect, but the owner must learn that he has to deal with business men who are not buying prospects.

MINING AND SCIENTIFIC PRESS.

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J. F. HALLORAN.....General Manager

San Francisco, January 23, 1897.

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The Debris Question Reopened.

In this issue of the MINING AND SCIENTIFIC PRESS is published the third of a series of articles on the debris question, written by an engineer with a desire to simply give the data as to damage done and where the responsibility lies. Most of this data—in fact, nearly all—is taken from reports made on behalf of the farming interests or by the Federal or State Government engineers. The showing made is, therefore, about what would be made by any honest-minded man on the side of the farmers. To sum up briefly, they show:

First—Of the debris sent down into the Sacramento drainage system while hydraulic mining was carried on unrestrictedly, not over one-fifth could have come from the mines.

Second—Owing to the increased population in the foothills and mountains since that time, and consequent greater erosion, the amount of debris now coming down is about as great as it was while the mines were in operation, and consequently the evils then complained of are as great as ever.

Third—That had hydraulic mining not been discontinued some $75,000,000 would have been produced from the mines, and the loss in value of capital and income to the State has amounted to over $200,000,000.

Fourth—The direct damage caused by the debris making lands valueless, loss of product and loss to sympathetic industries has not amounted to over $50,000,000, and of this certainly not over one-fifth could be charged to the hydraulic miners.

Sixth—The maximum damage possible if all lands that lie low enough to be covered with debris should be destroyed would not exceed $40,000,000.

The Legislature will doubtless reappropriate $250,000 to be expended by the Debris Commissioner in conjunction with the U. S. Debris Commission in building restraining dams. This with the $250,000 appropriated by the Federal Government will give a total of $500,000. Besides this a bill providing for the appropriation of $300,000 under the direction of the Commissioner of Public Works and an auditing board for dredging the Sacramento river is in committee and is receiving the endorsement of both leading mining as well as farming members.

It would seem that without much trouble, now that good feeling has come between the two interests, something more could be done looking toward the reopening of hydraulic mines upon some basis that would not place such heavy burdens upon the miners.

The Proposed Secretaryship of Mines and Mining.

Senator Perkins has introduced in the United States Senate a concurrent resolution looking toward the establishment of a Secretaryship of Mines and Mining. The resolution, after reciting that the mining interests of the country have no clearly defined representation in the organization of the Government, and that it is desirable that there shall be gathered statistics and other information of value to the mining and related industries, and that it is desirable that all such work should be done by one organization, provides for the appointment of a commission, to consist of the Commissioner of the General Land Office, the Commissioner of Labor and the Director of the Geological Survey, "whose duty it shall be to determine the best method of ascertaining all the facts of general importance relating to mines and mining within the United States, whether by a mining bureau, a Secretary of Mines and Mining, a Commissioner of Mines, or a commission, and to report to the Secretary of the Interior for his examination and approval a bill providing means for securing all necessary information concerning mining and related industries within the United States."

This, it would seem, is a better method for a beginning than by the introduction of a bill at the present session which could not possibly be acted upon. As it is, if the commission receives assistance in its work from the miners themselves, the mining associations and other bodies interested as to the need of such a department, and makes an early report, there should be little trouble in bringing before Congress at the next session a statement of their needs in the case that should compel attention.

Those interested in the matter should now, as speedily as possible, take steps to urge upon the Senate and the House the passage of the resolution. Failure to pass it at this session will mean the loss of another year, at least, and as there is only little time left before the closing of this session there should be no delay.

It is to be hoped that something will be done to interest in this movement the great mining interests of the East. Should the coal, iron and other mining industries of the United States join with those engaged in producing the more precious minerals, it seems probable that whatever they would ask for, in reason, would be granted.

As to the personnel of the Commission proposed, while the present Commissioner of the Land Office would hardly be inclined to favor the proposed new department, if he is to be judged by his past attitude, much may be expected from the Director of the Geological Survey. The exceptionally good work that he has done while in that office, in making the survey of value, from an economic standpoint, to the mining industry, gives promise that his suggestions would be of value.

It would be well, now that the State Legislatures are in session in many of the States and Territories interested in mining, if they would pass resolutions urging upon Congress the passage of Senator Perkins' resolution.

The Legislative Committee's Bill.

The sub-committee of the Committee on Legislation of the California Miners' Association appointed to frame bills to be proposed to the Legislature as to mining laws has prepared a bill to supplement the Federal statutes in regard to the manner of locating mining claims and mill sites. This is to be submitted to the Executive Committee of the Miners' Association at a special meeting before it is sent to Sacramento.

The cause for a very general demand in this State for a bill on this subject has been the need for some legislation supplementing the Federal statutes, particularly as to what shall constitute a valid location as to marking, posting notices and recording them.

The most fruitful cause of litigation in this State has been the want of a State law on the subject. All other States and Territories have passed laws defining what marking shall be done in making locations, the recording of notices, etc. The Federal statute says simply that the location must be distinctly marked on the ground so that its boundaries may be readily traced.

The Supreme Court and other courts of this State have wrestled with this time and again, and have always complained that there is no State law for determining what shall constitute a proper marking.

Now comes the sub-committee of the California Miners' Association and propose that the State Legislature shall enact that the locator "must distinctly mark his location on the ground, so that its boundaries can be readily traced, and must file in the office of the County Recorder a certificate of location." Except as to the clause about recording notices, the enactment of this by the State would be a piece of supererogation. It might as well re-enact the Constitution of the United States. The rest of the proposed bill refers to details, some of which are of value, but it is altogether emasculated by the failure to provide for what is of first importance.

It cannot very well be claimed that the miner objects to having the State enact what marking shall be done, for in nearly every mining district formed in this State rules have been laid down as to how many stakes or other monuments should be erected. The number varies, of course, and so is the cause of confusion that it is desired should be remedied. Again, all the other States and Territories in which mining is conducted have adopted statutes in the case, and they have been found to work satisfactorily. There must be some sound reason as a basis when half a dozen States and Territories and a hundred mining districts will voluntarily do this. If there were any exceptions except the State of California, or even if the districts in California were exceptions, there might be good reason to claim that there are two sides to the question.

The Yield of Precious Metals.

On another page will be found the report of Wells, Fargo & Co. on the yield of precious metals, produced in the States and Territories west of the Missouri river, including British Columbia, in 1896. Without the valuable data gathered and supplied by this company annually, there would be much more difficulty in obtaining an approximate estimate of the product of these minerals than there is. Yet, until the other special sources of information have been heard from, these figures cannot be considered as at all final. One great advantage about them is that they are conservative. Larger outputs are claimed in nearly every district mentioned, but this is always the case. The total output of gold in the United States is placed at somewhat less than the last estimate of the Director of the Mint, which was $51,000,000, and that was less than others.

It is probable that the total will be considerably larger, for figures have come from reliable sources in South Dakota, Colorado, and California, for example, that go to show that Wells, Fargo & Co.'s returns are low. So it is with the yield of silver and other minerals in certain districts. Last year Wells, Fargo & Co. estimated the gold yield of California at considerably less than it was shown to be later by the mint and other returns, and so with Colorado. Considering that that report was published at the close of the year, however, and not after waiting months for returns, it was remarkable that it was so near correct.

The yield of British Columbia in gold and silver is put at $4,340,000. Last year it was less than $500,000. As there has gone into that province a large amount of machinery, and many large new mines are beginning to produce, while the big producers of last year promise to keep up their yield, it is likely that the output for 1897 will, as the newspapers of the Northwest claim, be double that of 1896.

INVESTORS will not go to the necessary heavy expense of having a mine examined without some proof that there is a strong probability that it is valuable. For this reason they refuse to examine many good properties that are not properly presented. Mine owners should learn that mines may be sold by samples of the ore bodies, to a certain extent, just as are wheat and other articles of commerce. Yet the average mine owner has a bad habit of taking samples that are of no value, and not only deceives himself, but others. He must learn that mines are not purchased nowadays without thorough examination and that he must present only such facts as may be substantiated.

Concentrates.

THE fee for an application for mineral entry or land for a mill site is $10.

THERE were forty-four mining locations recorded in Calaveras county, Cal., last week.

MINERS from Webb county, Mo., are being sent in considerable numbers to Leadville, Col.

THE output of British Columbia for 1896 is placed on rather conservative estimates at $5,000,000.

SI DROUILLARD AND N. T. BLAIR have located 3000 acres of placer ground in Esmeralda county, Nev.

THE Butte, Montana, Reduction Works have been rebuilt by W. A. Clark and now have a capacity of 500 tons daily.

ACCORDING to the Reno, Nev., *Gazette*, James Burke has discovered cinnabar in his lime mine at Steamboat.

ONE who located a mining claim on January 1, 1897, will have until Jan. 1, 1899, to do his assessment work.

IN Siskiyou county, Cal., last week, twenty locations of mining claims and four of water rights were recorded.

VICTOR, Colorado, is said to be the only town where business houses are torn down and moved off to make room for shaft houses.

AT a depth of 700 feet in the Park Regent mine in Colorado recently a piece of wood three feet long and three inches thick was found.

THERE is more activity in the Los Angeles oil wells than at any time last year, and the price has risen from 30 cents to 90 cents and $1.

THE properties of the Butte & Boston Company of Montana will be sold February 1st and will probably be bid in by the reorganization people.

THE Salt Lake *Tribune* states that a 4-foot vein of "soft clayish soil" has been struck near Grand Junction which assays $7 per ton in gold.

A MAN—not an old miner, but a politician—in Mojave county, Arizona, has discovered a copper mine, the ore from which he claims goes 140 per cent in copper.

THE Utica-Stickles mine, Calaveras county, and the Golden Cross mine, Hedges, San Diego county, Cal., have the same number of stamps in operation—140.

IT is claimed by the La Belle, New Mexico, *Crescent* that $500,000 will be spent in developing and fitting up placer mines in the neighborhood the coming year.

INSTEAD of building a branch from Mojave to Randsburg, Cal., the Southern Pacific has contented itself by putting on an opposition stage line and cutting rates.

JANUARY promises to be the banner month at Cripple Creek, Colo., as to the amount of production. It is claimed that it is apt to be double that of January of last year.

"MORE assessment work has been done in this district in '96 than ever before in one year," is the universal statement in every paper published in the mining districts.

A PETITION has been made to the Shasta county, Cal., board of supervisors for a franchise to construct and operate an electric railroad from Redding to Keswick, eight miles.

IT is reported that experts are again examining the De Lamar mines in Nevada for English capitalists. The owners last year refused an offer of $3,100,000 for the property.

BETWEEN Verde and Jerome, Arizona, there are over sixty men prospecting, most of them having gone there recently on account of the strike of a large ledge, assaying high in gold and silver.

MAJOR MYERS of Fort Jones, Cal., encourages a novel method of gold production by the statement that every native chicken killed in Siskiyou county has from 30 to 50 cents in gold in its crop.

A SEER, who claims to know, writes from Battle Creek, Mich., that he has positive assurance that the world will come to an end May 7, 1897. Very well. The most of us can get along just as well without it.

ARTICLES of incorporation have been filed in Denver of the Rocky Mountain Smelting Co., to be located at Florence, Col., with a capital of $750,000. Charles Foster, ex-Secretary of State, is one of the directors.

THE stockholders of the Cadmus Mining Company, most of whom are San Franciscans, have been invited to the mine at Grass Valley next Monday, when the new 10-stamp mill and other new machinery will be put in operation.

PREDICTIONS as to what will be the product of mining districts for 1897 are already the vogue in local papers. It would be interesting to sum them up and show that the product of the United States in gold will exceed $100,000,000 easily.

IN the California Legislature Assembly bill No. 30, regulating the mode of operating mines where blasting is being done, and providing for circulating copies of the act, has been recommended for passage by the Mines and Mining Committee.

IN the new Grand Encampment district, south of Rawlins, Wyoming, several local capitalists have located 4000 acres of placer ground and have secured all the unappropriated water in the north and south forks of the Grand Encampment creek.

MINING men everywhere should beware of proffered illustrated "write-ups" in "mining journals" for so much or so little per page. That questionable industry is more than usually active at present, and is being worked for all it is worth.

TESTS have been made of mineral that proved to be stream tin which came down from placers in Lemhi county, Idaho, where it was associated with gold, and is said to exist in paying quantities. Last fall some 500 pounds of it was saved for the purpose of testing.

WITHOUT detracting from the value of the defeat of the funding bill, it is to be said that a measure of more importance to the people of the State of California is the passage of the mineral land bill, which was marked for defeat last May, and is now up for passage in Congress.

AN examination of the Mercur mine in Utah is being made on behalf of Capt. J. B. De Lamar, who has an option on it for $1,500,000. It is understood that if the deal is closed the new owners will erect a mill with a capacity of 500 tons daily. At present 230 tons a day are being worked.

DURING the year 1895 about 1,250,000 barrels of oil were produced in California. Of this amount, very nearly 1,000,000 barrels were produced in Los Angeles county, and something less than 250,000 in Ventura county. It is probable that the yield for 1896 will not fall very far short of this amount.

NICKEL production in the United States in 1896, entirely from Canadian ores and matte, reached a total of 3,697,039 pounds—2,678,661 pounds in 1895. Of the production in 1896, metallic nickel amounted to 1,600,049 pounds, the remaining 2,096,890 pounds being in the form of oxide and sulphide.

SOME miners say that a mine named after a woman never proves to be a good one; that those which have the word "blue" or one of its compounds in their names are sure to be paying properties, and that those named for the stars are more likely to turn out rich than not. There are exceptions to this rule.

THE Salt Lake people who have taken hold of mines in the Meadow Lake district, in Sierra county, announced that work on a toll road from Truckee and Cisco will be commenced about May 1, and early in the spring a furnace will be erected in the old mining camp to reduce the ores to matte to be shipped to the smelters.

THE discovery of coal in a number of districts in Nevada give promise of a new industry for that State. The Nevada Central Railway Company has put eight men at work on a coal mine near Crum canyon, near Battle mountain, and it is said that the prospects are favorable for the development of extensive coal beds.

STATE MINE INSPECTOR SHOEMAKER, of Montana, recommends that the Legislature pass a law providing that all mines worked below a certain depth must have two means of exit. He also believes that the powers of the mine inspector should be so extended that he could order any needed improvement made at the expense of the mine owner or operator.

A CRISIS in the great strike in Leadville has at last been reached that brings a calamity that will affect both the strikers and the mine owners. The pumps that drain the mines on Carbonate hill have been pulled out and within a short time most of them will be flooded. Even if the strike should be settled now, it would be a long time before work could be resumed.

THE monthly output of the Baker City, Oregon, camp is placed by the *Spokesman-Review* at from $160,000 to $170,000, and it says that the principal producing mines are the Virtue, producing $30,000 a month; Bonanza, $18,000; E. & E., $25,000; North Pole, $15,000; White Grouse, $10,000; Baisley & Elkhorn, $10,000; Red Boy, $10,000. The shaft of the Virtue is now down 700 feet.

A BILL has been introduced in the Legislature by Senator Mahoney dealing with corporations. It provides that no assessment shall be levied by the trustees of a corporation without the concurrence of a majority of the shareholders and after a sworn statement of the officers as to the condition of the corporation and further that the owners of stock sold for assessment shall have the right to redeem within six months.

WALL STREET is reported to give credence to the statement that the Rothschilds have in the last four months bought up 127 silver mining claims in one district of New Mexico, ranging in price all the way from $1000 to $180,000, and asks: "Do these mighty European bankers intend to rehabilitate silver after they have depressed the price low enough to scoop in all the desirable mining properties?" Such a "scoop" is beyond even the financial resources of that great firm.

IT is claimed that the first application of electricity to mining was at Aspen, Colorado, July, 1888, when the first electric hoist in that region was started in the Veteran tunnel. It consisted of a 7½ H. P. street car motor of one of the earliest types which were then just coming into use. There are now in use at Aspen thirty motors varying from 1 H. P. to 120 and aggregating 622 H. P., which are used for hoisting, ventilating, drilling, mining mills, samplers and miscellaneous machinery.

PAPERS have been prepared for application to the Provincial Legislature of British Columbia for a charter to construct an electric railway from the international boundary line to Grand Forks, Anaconda and Greenwood, and thence to Rossland. An application will also be made to the Washington Legislature for a charter from Spokane to the international boundary line, and, if granted, work is to begin early in the spring. The power it is proposed to obtain from the falls of the Kettle river.

A MINERS' CONVENTION will be held at an early date at Perris, Cal., to which all people interested in mining in southern California are to be invited. There are two main objects stated—the first to get the Legislature to take action recognizing the mining district recorders as officials, empowering them to administer oaths, and dispensing with the recording of mining claims with the county recorders; and the second, to get the Interior Department to take steps to secure the passage of the mineral land bill now before Congress.

THE mine owners of British Columbia are not giving much encouragement to promoters of devious practices and wildcats. At a meeting of the Anaconda Club lately the secretary was instructed to give, gratis, full information to intending purchasers of stock of that district as to amount of work done, number of persons employed, and such other facts as may be in his power to give. Similar good work is being done by the newspapers of British Columbia and of Toronto and Montreal. Nothing could do so much to inspire the confidence of foreign capitalists.

THE Canadian tariff commission has been considering a plea from people from British Columbia for the free admission of mining tools and machinery. They assert that the mining industry is severely handicapped with an excessive and crushing tariff. Nearly every article entering into the operation of a mine, together with every article of consumption by the miner, is tariff-stricken. As a result of this, it is claimed, vast areas of low grade ores in nearly every section of Canada remain untouched. They claimed that by reducing the cost of production one hundred thousand men would be given employment between Cape Breton and Vancouver. Expectation that the coming year will bring the desired reduction has a tendency to limit the camp's present output. A number of developed mines could ship in large quantities, and derive a profit at existing charges, but their owners prefer to hold their ore bodies in reserve and wait for lower freight rates and smelting charges.

PROF. W. LINDGREN, of the United States Geological Survey, writes that the Nevada City folio, descriptive of the mines of Grass Valley and Nevada, published lately, and from which some description of the geology of the district has been published in the MINING AND SCIENTIFIC PRESS, is merely a condensed statement from the more extended report on the district, and which will be ready for distribution in about two months. A great many important questions are there treated in detail, which could only be briefly touched upon in the folio. The report will comprise 250 pages, with 24 plates.

SPOKANE papers are advocating the building of a smelter at that place. Vancouver is doing all it can to have a smelter built there. It is thought that one may be built at Northport, Wash., near the international line, on the road from Spokane to the Kootenay mines. Tacoma people are advocating a smelter at that point. Three smelters have been built in the Kootenays. The great advantage of the mining districts of the Northwest is railroad competition, which gives every encouragement to the opening up of new districts by giving facilities for shipping and incidentally of working the ores at low rates.

FROM the Slocan district alone in British Columbia it is claimed that forty-seven mines will ship ore during the year, and that the amount will aggregate nearly 50,000 tons. There is very little machinery in the district. The Noble Five is equipped with a 120-ton concentrator. The Slocan Star has a concentrator and a compressor plant. The Three Forks concentrator has a capacity of sixty tons, as has the Washington concentrator. This includes all of the machinery in the district except a few hoists. There is not a steam hoist in the Slocan. An estimate of the product of the Trail Creek district for 1897 places it at 350 tons a day.

IN New York Judges Lacombe and Wallace of the United States Circuit Court of Appeals, in a decision last week, classified natural gas as a mineral for all the purposes of the statutes and customs laws. This affirms the finding of the Circuit court of the district, which upheld the Board of General Appraisers' declaration "that the natural gas piped from Shirkstown, Canada, to Buffalo, N. Y., is not subject to duty because it is within the definition of 'crude minerals.'" Under section 4 of the McKinley tariff the collector of customs, however, assessed the imported gas at 10 per cent, holding that the gas is "a raw or manufactured article not enumerated or provided for."

THE syndicate operating the Corral Hollow coal mines, in Contra Costa county, and the Alameda and San Joaquin railroad, built to give them an outlet to Stockton, state that both properties will be in operation by February 1. The syndicate has invested in the railroad and mines $1,750,000. Over $750,000 was spent in buying the land at Corral Hollow and in partially developing the seven veins of coal found there. The remainder went into the railroad, which is thirty-six miles long; into mining machinery and additional development work. A shaft 1500 feet deep has been sunk and the machinery now placed at the mines will have a capacity of handling 1500 tons of coal a day.

REPRESENTATIVE ALLEN of Utah, has secured the passage through the House of Representatives of his bill to amend the Revised Statutes as to procedure in acquiring mineral land titles. The first object of the bill is to allow affidavits required under the land laws of the United States to be sworn to before an officer of the Government having a legal seal, thus saving loss and expense caused by requiring persons to go before the register and receiver of the land office for such a purpose. The second object of the bill is to establish rules of procedure in contest cases between claimants of mineral and agricultural lands. It provides that in case of contests as to the mineral or agricultural character of the land, testimony and proof may be taken under such notice and regulations as the Commissioner of the General Land Office may prescribe, concluding, "that wherever the land is proven to be within a well defined mineral belt, it shall be deemed prima facie evidence of the mineral character of said land."

IN the U. S. Senate last Wednesday Senator Perkins of this State introduced a concurrent resolution which sets forth that the mining interests have not a clearly defined representation in the Government, and for the collection of statistics and other information that will be of value to mining and related industries better plans are necessary. To accomplish this a plan is set forth in this form: *Resolved*, That a commission be and is hereby formed, consisting of the Commissioner of the General Land Office, the Commissioner of Labor and the Director of the Geological Surveys, whose duties shall be to determine the best method of ascertaining all the facts of general importance relating to mines and mining within the United States, whether by the Mining Bureau, the Secretary of Mines and Mining, the Commissioner of Mines or a commission, and to report to the Secretary of the Interior for his examination and approval a bill providing means for securing all the necessary information concerning mining and its related industries within the United States.

ACCORDING to a dispatch from Washington, Director Walcott of the United States Geological Survey has published a report upon the gold fields along the Alaskan coast. An expedition sent out last summer traversed the valley of the Yukon from the British boundary on the east to the mouth of the river on the west. All of the well-known placer deposits were examined, and the origin of the gold in them was traced to the quartz veins along the headwaters of the various streams entering the Yukon. Sufficient data were secured to establish the presence of a gold belt 300 miles in length in Alaska, which enters Alaska near the branch of Forty Mile creek and extends westward across the Yukon valley at the ramparts. Its further extent is unknown. It is the opinion of the geologist in charge of the expedition that it is entirely practicable to prosecute quartz mining throughout the year in this region. He also discovered along the river acres of rocks containing hard and bituminous coal. The director thinks in view of these facts that a reconnoissance report should be made of the gold and coal areas in order to secure an intelligent conception of the resources of the interior of Alaska, and for this purpose asks an immediate appropriation of $25,000.

Vancouver Island.

Written for the MINING AND SCIENTIFIC PRESS.

A good deal of interest has been directed to Vancouver island recently on account of its great mineral wealth, the island being rich in gold, copper and coal, particularly the latter. A large percentage of the coal used by the steamers running north, by the cities and towns in British Columbia and by the city of San Francisco comes from the coal mines at Nanaimo and Comox, the former having been worked for many years and having produced an enormous amount of very fine coal. The Comox coal fields are of more recent origin, but of excellent quality and great extent.

Vancouver island lies between north latitude 48.15° and 50.53°, and longitude 123.12° and 128.28° west from Greenwich. It is 260 miles long and its greatest width is 79 miles, but both on the north and on the south long canals or sounds run easterly far inland from the Pacific ocean, Alberni canal, for instance, running inland for 15 miles, with a depth of water ranging from 66 to 624 feet, and connected at its upper end by Stamps river to two lakes, the Klecoot and the Great Central lake, the latter being 18 miles long, 3 miles wide and having a depth of water ranging from 300 to 600 feet.

Pretty near the north end of the island is another of these great canals, called Quatsino sound, which, running a little north of east for 23 miles, makes a turn of nearly a semicircle and runs north of west for 25 miles farther. There are two arms; one, 17 miles from the entrance, runs south by east for 17 miles, and another, 22 miles from the mouth, runs 7 miles east. The depth of water is from 100 to 400 feet throughout. Twenty-two miles up the sound from the Pacific ocean is a beautiful harbor called Coal Harbor. It is 2000 feet wide at its mouth, widening out to a diameter of 4000 feet, with fine anchorage in water from 40 to 90 feet deep close to shore.

The waters here abound in salmon, halibut, herring, and the woods in bear, elk, deer and smaller game, while duck and geese are abundant in season.

The climate, under the influence of the warm current flowing from the west, is mild and agreeable. Snow sometimes falls to the depth of 1 foot, but melts off rapidly. The rainfall is seasonable and not excessive. Great forests of spruce, hemlock, fir and cedar cover this part of the island, the cedars reaching a large size.

The hills in the vicinity of Coal Harbor are not very high, generally not exceeding 100 feet, although on Vancouver island there are numerous mountains over 6000 feet in elevation, but the presence of such an abundance of timber and the undulating character of the ground has made the country difficult of exploration. While the south end of the island, as far as Alberni, is pretty well known, but little is known of the region in the vicinity of Quatsino sound.

Within the past year quite a number of Scandinavians have been attracted to this locality and are well pleased with it, believing in the future developments of its mineral wealth, the presence of plenty of fish, game and wood assuring them of a living. But until their arrival a few months ago this part of Vancouver island was inhabited only by Indian tribes, and at the time of the visit of Mr. A. S. Hallidie, in October, 1895, there were neither horses, cows, pigs, sheep nor chickens there.

The island at Quatsino sound is not very wide and deep water runs up into Coal Harbor, which is only 9 miles west of Hardy Bay, on the east coast, and where there is an excellent harbor, with good anchorage and plenty of water, Hardy Bay being situated on the inland passage from Puget sound to Alaska.

Across this narrow neck the Government is building a wagon road, which will connect Coal Harbor and Hardy Bay, and will give Coal Harbor splendid shipping facilities on both sides of the island, and when the great coal measures of this district are developed, will enable coal to be delivered directly on board the largest ocean ships at Coal Harbor on the west and Hardy Bay on the east of Vancouver island.

As early as 1872 Mr. John J. Landale, an English mining engineer, made an extensive examination of the coal and other minerals in the vicinity of Coal Harbor, and reported the coal field as covering 5000 acres and the amount of coal computed to exist, based upon his actual exploration, to be 33,000,000 tons, or 600,000 tons yearly for a period of fifty-five years. There are five seams, the thickness being 2 feet 8 inches, 3 feet 6 inches, 1 foot 10 inches, 2 feet 6 inches and 4 feet 6 inches, respectively.

Since then Mr. M. B. Silver has made further exploration and discovered fresh seams, one of which is 12 feet wide.

Mr. Landale reports analysis of these seams as containing:

Carbon	60 to 71
Hydrogen	5 to 8
Nitrogen	1.10 to 1.75
Oxygen	4.55 to 13
Sulphur	0.3 to 0.9
Ash	12.39 to 25

Mr. Robert Brown, in his paper on "Coal Fields of the North Pacific Coast," translation of Edinburgh Geological Society, 1868-9, gives an analysis of the coal of one of the above veins by Mr. G. C. Hoffman, as follows:

Hygroscopic Water	1.05
Volatile Combustible Matter	34.38
Fixed Carbon	54.01
Ash	10.56
Total	100.00

Mr. Landale reports also the presence of rich cop-



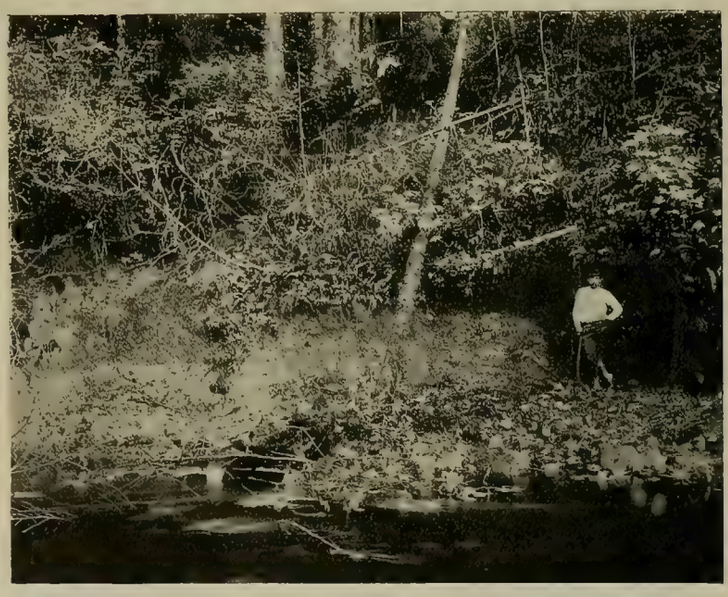
OFFICERS, CREW AND PASSENGERS ON BOARD THE MISCHIEF, IN COAL HARBOR, QUATSINO SOUND.



KEEPER'S HOUSE — COAL CROPPINGS AT WATER'S EDGE, WEST VANCOUVER COMMERCIAL CO.



12-FOOT COAL SEAM, THREE MILES WEST OF COAL HARBOR.



COAL SEAM 5 FEET WIDE AND TUNNEL, NATZENAUCHTUM CREEK.

per veins and numerous indications and outcroppings on this part of the island.

Very little attempt has been made to further develop this coal area, except that made by the West Vancouver Commercial Company with a small drill, but as the cores obtained were only ½ inch diameter they did not bring up sections intact.

All the streams carry float coal, and coal veins outcrop in a number of places on the shore near Coal Harbor, and the coal is and has been used by steamers visiting that locality since the British steamer Hecate got her coal there in 1870.

The waters and shore line of Quatsino sound are beautiful and romantic. With a good steamer it can be reached in 36 hours from Victoria, and will be a revelation to the tourist and hunter, as it surpasses in beauty Puget sound and has a water area of about 200 square miles.

Mr. Hallidie circumnavigated Vancouver island in the fall of 1895 on the sixty-ton steam schooner Mischief, going north from Victoria on the Pacific ocean side, passing around Cape Scott, the northern extremity of the island, and returning by the inland passage on the east side of Vancouver island, stopping at places en route, particularly at Quatsino sound, where he spent some days.

There are a great many points of interest to the geologist, botanist and general tourist, and innumerable inlets on the rugged west shore that cannot fail to interest those visiting that comparatively inaccessible and virgin country.

We give six views: Fig. 1, deck of steam schooner Mischief, with Mr. Hallidie sitting on a stool, with field-glasses in his hand, and the captain of the Mischief, Captain Foot, sitting on a box filling his pipe. Fig. 2, keeper's house West Vancouver Commercial Co., coal cropping of vein, 2½ feet wide, at water line. Fig. 3, coal croppings (12-foot vein) on the shore three miles west of Coal Harbor. Fig. 4, coal seam, 5 feet thick, and tunnel on Natzenauchtum creek, Coal Harbor. Fig. 5, cedar timber back of Coal Harbor. The dimension of this timber can be realized by comparing with the size of the man standing alongside. Fig. 6, same as Fig. 3.



CEDAR TREES BACK OF COAL HARBOR, QUATSINO SOUND.

A Wonderful Calendar.

There is nothing more wonderful in the chronological and time-keeping line than the "Theosophical Calendar According to the Secret Doctrine." From the theosophical point of view the four ages are as follows: Sata Yuga (golden age), 1,718,000 years; Tresta Uga (silver age), 1,296,000 years; Dwapara (copper age), 864,000 years; Kali Yuga (iron age), 432,000 years. The total of these four ages makes one Maha Yuga, or great age, of 4,320,000 years. One thousand Maha Yugas make one Kalpa, or Day of Brahma, equal to 1000 times 4,320,000 years. After the expiration of that unthinkable period of time the Night of Brahma (equal in duration to the length of the day) comes on, and the earth vanishes from the plane of existence. Three hundred and sixty days and nights of Brahma make one year Brahma, and 100 years of Brahma make the Great Kalpa, a period of 311,040,000,000,000 years, after which the sun and the entire solar system plunge into impenetrable night, and everything on the "objective plane" is destroyed. Then comes the period known as the Great Night, and which is equal in length to the Great Kalpa. After the Great Night has lifted its sable mantle a new solar system is formed and evolution begins anew.



12-FOOT COAL SEAM, THREE MILES WEST OF COAL HARBOR.

According to the doctrine of the theosophists, we are now living in the Kali Yuga, the last of the four ages, and it began nearly 5000 years ago, with the death of Krishna, who died 3102 years before our era began. The first minor cycle of Kali Yuga will end in the years 1897-98, but will still have something like 427,000 years before we arrive at the end of the present age.

Kali Yuga is also known to the theosophists as the Black Age. It is an age of spiritual darkness in which the human race prays for the misdeeds which are recorded against it in the previous ages.

THE second annual general report upon the mining industry of the United Kingdom and Ireland was issued by the Home Office on Friday December 4th. The total number of persons employed at all the mines and quarries in 1895 was 838,282, of whom 733,657 were employed in or about mines, and 104,625 in or about quarries. Of the 733,657 persons employed at mines 584,298 worked below ground, and 149,359 above ground, of whom 5636 were females. The total value of all the minerals produced was £69,129,667 or £8,769,274 less than the corresponding figure for 1894. This great diminution in the total value is partly accounted for by a decrease of five and a half millions in the value of the coal, and a decrease of more than £300,000 in the value of the iron ore, although, in both cases, the quantity raised was greater. In fact, compared with 1894, there is an increase of 1,383,837 tons of coal, or .73 per cent., and an increase of 248,106 tons of iron ore, or 2 per cent.

MEN AND WOMEN have each their sphere in society. Woman may be fitted to fill man's place, but man can not fill woman's. So if woman enters man's sphere there must remain in society a place unfilled, a work undone.

THE Pacific Coast Oil Company, of which Charles N. Felton is president, has leased the Schubert ranch near Half Moon Bay and the Bell ranch at San Gregorio for ten years with the object of sinking oil wells.

The Skiff Mining Expert of the Lower Colorado River.

Written for the MINING AND SCIENTIFIC PRESS.

"Their cause I plead,—plead it in heart and mind;
A fellow feeling makes one wondrous kind."

Premising the gentlemen who, during the delightful winter season peculiar to this desert region, meander adown the Rio Colorado of the West by skiff, the initial point The Needles and the journey terminating at Yuma, have a knowledge, practical or otherwise, of mines, the writer, for their better understanding as a minor factor, and that the investigating public who employ them to expert the territory bordering the Colorado river more particularly, would mildly suggest that mineral deposits do not occur hereabouts radically different from those that are found in less uncongenial physical surroundings. A similarity of diverse geological conditions prevail, as they do in sections more kindly favored by nature. The mineralized lodes exist in the granites, porphyries, slates, etc., as veins of true fissure, contact, segregation, blanket, gash, and their modifications, and in the mountain ranges generally bordering the Colorado river, as a rule somewhat away from the river's brink, in fact, often some miles distant. Now, this is certainly unfortunate—not to say criminal—in that it conduces to the discomfort of some of these gentlemanly experts and renders inoperative their efforts to "Help the blasted country out, don't you know."

There is reason in all things, but who would expect a gentleman to tramp it, or, perchance, to ride an undignified burro anywhere from 5 to 25 miles in such a beastly, inartistic country! Certainly it would have been nicer had these several remote (?) mining districts moved their lode veins to the river's brink, stood them on end, and labeled their several virtues (they seldom have faults), for the edification of these meandering critics.

When the Roentgen rays shall have attained perfection, doubtless, one may mine expert the desert region bordering the Colorado of the West while floating down its yellow waters.

There are many conscientious mining men, who, having "reported" certain properties on the Colorado river, have advices to continue on by skiff and look into any other "prospect" they may hear of.

Receiving no accurate information whereby he may to a certainty find some of the many mining prospects that are being exploited in a small way by the original locators, and with nothing to mark the steamer's landings save, probably, a small flag, this vast virgin field is but touched. To this class of "mining men" this letter has no application, as they *never* condemn wholesale an unknown territory. But the gentleman who, "girding up his loins," with advice and condolence from admiring friends and employers, more or less firmly seats himself in the stern sheets of a staunch skiff, with an old riverman and expert camper for motive power, braves the perils of the turbid Colorado—likewise the canned and bottled goods, with bedding galore—launches forth as a modern Columbus, in the interests of —— and shekels, having returned to the fleshpots of Egypt, he invariably, and with a jauntiness that would be amusing were it not harmful, either "damns with faint praise," or literally damns and condemns a region of which he personally has absolutely no knowledge whatever.

The writer knows of several meritorious mining "prospects" bordering the Colorado river where the owners have been and are slowly doing legitimate exploratory work; they are earnest, industrious men, and, having faith in their claims, prove it by putting in their time and money as best they may, working under disadvantages residents of more congenial climatic surroundings have no conception of. These men generally do not wish to sell out entire, but would like development money for interests in their holdings. When working to that end—as an instance—the miner was met by the assertion: "Why, I have been told that there are no good mines along the Colorado." When cited to the Gold Rock, with its 150 stamps dropping on pay rock; the La Fortuna, turning out $80,000 in gold each month with 20 stamps; the Senator, to be heard from, holding 12 feet of rich pay rock at the 200 level, and, from all evidence, a rival to the La Fortuna in the early future; the developments in the old Picacho district, on wholly new ground, with mills now in and those on road approximating 130 head of stamps—as some of the *going* mines on the Colorado river, near to Yuma, the reply was: "Yes; but the region *you* are in is a new territory; I have not heard of it." The wholesale condemnation of a vast, practically unknown territory by the gentleman *in* the skiff may have choked off this deal, for we know how ill news travels, however slight and trivial the foundation.

I sometimes wonder if it occurs to some people that there is an inception process in a mine—a *beginning*—just as there is in every other condition, from the founding of a world to the infant puling in its mother's arms, who may in the course of events deliver harmful mouthings to cover up his personal shortcomings.

TAYLOR D. MACLEOD.

Yuma, A. T., January 18, 1897.

The Copper Mines of Nevada.

Written for the MINING AND SCIENTIFIC PRESS.

Nevada is wonderfully rich in copper, yet is not known in any market as a copper-producing State. In the scramble for mines of the more precious metals not much attention has ever been given to the copper-bearing veins of the country. Indeed, for fifteen to twenty years, while the silver harvest was in profitable progress in all the leading camps, miners and prospectors cared for nothing but silver lodes; even gold-bearing lodes of good promise were given the second place, if taken hold of at all. Thus it happened that no one ever thought of Nevada as a gold-producing State until recently, when men turned their attention to searching for the yellow metal. It has been much the same as regards copper. Nevada is not thought of as a copper region, yet the State is full of copper lodes, many of which, properly developed, would prove very profitable and desirable properties because of a large per cent of the values they contain being in the precious metals. In places in Nevada copper is not only found in veins, but also in mountain masses.

Now that there is a greatly increased consumption of copper with a promise of a continuance of the present prices, if not of an advance in them, it would seem that the copper mines of Nevada should be worthy of the attention of capitalists. The development and working of the copper deposits would as much contribute to the prosperity of the State as would the opening up and working of the same number of mines of gold and silver. All the benefit derived by Nevada from the working of any of her mines comes to her in the shape of money paid to miners and other workmen as wages. However rich a gold or silver mine may be, the State is only benefited to the extent of the amount of money paid out as wages. The precious metals extracted and all the profits obtained go to the cities of the East and to Europe.

Some sporadic attempts at working the copper deposits of Nevada have been made from time to time, and with good results, the inefficiency of the apparatus and the methods employed being considered, but other enterprises constantly offered that proved more attractive, and when the price of copper went down the mines were shut down and the locations made on copper deposits by prospectors were nearly all abandoned. From 1875 to about 1882-3 the price of copper in New York ranged from 18 to as high as 25 cents a pound, when prospectors and mining men began to locate and open copper properties, but when copper went down to less than half the rates mentioned most of the locations were abandoned, their owners returning to the more profitable occupation of mining the precious metals.

However, considerable holding and development work had been done in different sections on copper deposits, and in a few places small furnaces were erected for smelting the ores. Some of the copper mines paid a fair profit, while copper commanded a high price, though the furnaces were poorly constructed and were mostly managed by persons of little experience in copper smelting. Some copper smelting was done as late as 1888 and 1890, also some small shipments of ore were still occasionally made to the East and England, particularly ores containing the precious metals.

Although copper veins are found in all parts of the State, from the Colorado river to the south line of Oregon, still there are in places regular belts of copper deposits, just as there are silver belts and gold belts. In some sections these belts are more or less mixed, when a lode running high in copper will be found to carry in addition paying amounts of gold and silver. Occasionally there are very large copper belts, as at Walker's lake and at places in Humboldt and Elko counties. By the early prospectors these were known as "copper regions" and generally shunned.

Most of the copper ore mined in Nevada in times past was sold to the acid works at Dayton, Lyon county, where it was used in the manufacture of bluestone (sulphate of copper). The Jackson mine, at Walker river, furnished much ore to the acid works. It is a mountain mass of copper ore. In working it neither machinery nor timbers were used. Pillars of copper ore from 10 to 15 feet in diameter were left as supports to the roof. The ore yielded from 25 to 80 per cent copper and from $5 to $15 a ton in silver. The Ludwig mine, near the Jackson, is equally rich. The owners of the Ludwig sold to the acid works ore to the value of $200,000 or $300,000. The ore was principally quarried from an open cut.

The Wheeler mine, west of Mason valley, sold ore to the acid works for a time. The ore runs about 25 per cent in copper. In this Walker river region are many copper mines on which no work was ever done. In all these mines are streaks of nickel and cobalt. In 1882 the Esmeralda Smelting Company, at Soda Springs, on the Carson and Colorado railroad, produced 350,000 pounds of copper. The ore was obtained from a mountain of copper near the works. When copper fell in price the smelter was shut down and nothing has since been done at copper smelting in any part of the State.

There are many good copper mines in White Pine county. In 1880 a mine in Robinson district produced 357 tons of ore that yielded 134,730 pounds of copper ingots. At Bald Mountain are also rich copper veins, the ore of some of which go as high as 60 per cent.

In Lander county, near Battle Mountain, is a small copper belt, four miles long and two miles wide, on the veins in which some work was done in early times. These mines all yielded more or less gold and silver. The Trenton went 15 per cent copper and carried $150 a ton in silver; the Bluebird, 28 per cent copper, $9 in gold and $21 in silver per ton; the Washington, 28 per cent copper and $50 to $60 in gold and silver; the Columbia, 50 to 75 per cent copper and $5 a ton gold; the Battle Mountain Company (four mines), one, 30 per cent copper and $9 a ton silver. They shipped to Liverpool extensively in 1870. The Josephine was rich in copper and paid $130 a ton in silver. The veins are from 4 to 6 feet wide and all carry gold and silver in addition to a good per cent of copper.

In Humboldt county are many copper deposits. Work was done on some of these in the early days. At one time the Lake Superior Company shipped from their mine, near Galena, 100 tons of ore a month. The ore went from 15 to 75 per cent copper and carried some silver and gold. It was sent to Liverpool at a cost of $35 a ton. The Virgin and other mines in the belt are of the same character, and all carry gold and silver. In Winnemucca district there are copper mines that carry from $15 to $25 a ton in gold and silver in all their ores. In Columbia district, Puebla mountains, Quin river, is a big copper belt, the ores of which carry gold and silver in addition to 40 per cent of copper. In this district is found much native copper. In Portis district, near the Little Salmon river, is a fine copper belt. The ores carry $9 in gold and 15 ounces of silver a ton and run about 40 per cent in copper. On the Little Salmon, some Montana men last summer put up a small prospecting smelter. It made such a good showing that other Montana parties will erect a large plant in the district.

The Adelaide copper mine is in Gold Run district, Humboldt county, twelve miles south of Golconda. Some smelting was done about 1889; but, for some reason, operations were discontinued. In the mine is a width of over 100 feet of solid ore. The ore carries both gold and silver. This mine is now being prospected by an English syndicate with a force of eighty miners. In the opinion of some experts, the mine will prove to be a second Anaconda.

There are many copper mines in Elko county, in Granite Mountain district, Sooner district, Kit Carson, and on the Salmon river. The veins carry from $40 to $60 in silver in addition to a paying per cent of copper. Nye county contains some large copper belts. In the southwestern part of the county is a remarkable belt of veins of copper and iron. In Volcano district are no fewer than thirty distinct copper lodes, all of great size, and all carrying gold and silver. Here are also found deposits of petrified trees of large size. It is a very peculiar and interesting region. On the slopes of some of the mountains are strewn great quantities of geodes of all sizes. When these are broken open they are found to contain beautiful crystals of a variety of colors. These geodes are not only strewn on the surface, but also in the ground beneath; they may be dug out like potatoes. About Palmetto, Esmeralda county, are many good copper mines, some of which carry over $50 a ton in gold and silver. In the placers at Tule canyon, in the same county, the gold is alloyed with copper.

At Peavine, Washoe county, are copper lodes that carry both gold and silver, and veins of the same character are found at Pyramid lake. In fact, copper is to be found in every county in the State, but, of course, not everywhere in paying quantities.

There are doubtless a sufficient number of copper lodes in the State, that would pay well if opened up and properly worked, to give employment to thousands of miners. It is to be hoped that such a success will be made by the parties now opening the Adelaide that capitalists will flock in and take hold of other properties of the kind. Since the days when the people of Nevada were experimenting with furnaces of various kinds and all manner of fluxes copper smelting has been reduced to a science in many places; therefore, were men of capital to bring to the State and put in operation up-to-date plants they would make a good thing out of our ores, as in most cases the gold and silver contained in them would add very materially to the value of the product.

Copper properties are now in brisk demand and the demand is likely to grow into a boom in the near future. The consumption of copper is increasing at a remarkably rapid rate in Europe, and the indications are that the demand for the metal will steadily grow, as there are now new uses for it in several directions, and particularly in the manufacture of electrical apparatus. The time is at hand when copper mines will no longer "go begging."

DAN DE QUILLE.

Virginia City, Nev., Jan. 17, '97.

Nevada City, Cal., District Geology.

NUMBER VII—CONCLUDED.

With the exception of the North Star group, nearly all in the veins in the larger, southern part of the district have a general north-and-south direction and a medium to flat dip either east or west. They are usually rather narrow, and carry a high-grade ore, with occasional bunches of coarse, free gold. The sulphurets, which consist chiefly of iron pyrites and some galena, are not abundant, and are usually only of medium grade. In places a strong sheeting of country rock parallel to the vein may be noted, as, for instance, in the granodiorite of the western part of Mill street, Grass Valley, or in the diabase in the vicinity of the Larimer mine on Wolf creek. Intersecting the vein is a system of "crossings," or barren seams, with a steep dip and general northeasterly trend. These crossings sometimes fault the veins slightly and usually carry a great deal of water.

The Rocky Bar vein extends for 3500 feet on the west side of Wolf creek and lies in diabase, the dip being flat to the east. It has been worked only to a depth of a few hundred feet, but is known to have produced several million dollars. During late years it has not been worked to any great extent. The vein is very irregular in its tenor, sometimes being extremely rich in coarse gold, sometimes not paying milling expenses. On the east side of Wolf creek lies the Dromedary vein, in granodiorite and with a westerly dip. It has not been worked to the extent of the former vein but is known to have produced some rich ore. At Granite Hill mine the vein is about one foot thick and carries coarse gold in rich but irregular shoots. The vein cuts the diabase contact without change.

In the continuation of this vein southward lies the Omaha vein system, all veins dipping west. The Omaha vein, which has long been an important producer, lies, like all others of this system, in very hard granodiorite, and has been opened up through the Omaha and Lone Jack shafts to a depth of 1500 feet on the incline. The ore is high-grade, with 2½ per cent of rich sulphurets, principally iron pyrites, with a little galena, zinc-blende, and copper pyrites, the vein averaging one foot in thickness. South of the Omaha and on the same vein are the Hartley and Homeward Bound, which have been opened up to a less extent. The Wisconsin is a parallel vein to the west. The system is continued southward by many veins, the most prominent of which is the Allison Ranch. It was worked between 1855 and 1866, but was opened only to a depth of 500 feet. It produced in that time $2,300,000. The vein is about 1½ feet wide and shows no extensive croppings on the surface.

The great Osborne Hill vein system contains a large number of parallel and linked veins, nearly all with a moderate westerly dip. The W. Y. O. D. vein has been an important producer during the last few years. It is partly in granodiorite, party in diabase, and has been sunk upon to a depth of 1100 feet on the incline. The Pennsylvania mine lies to the west of the W. Y. O. D., in granodiorite. It is a narrow vein, averaging 1 foot, and has been worked to a depth of about 500 feet on the incline. The celebrated Empire mine contains two veins, Rich Hill and Ophir Hill, the principal work having been done on the latter, on which a shaft has been sunk to a depth of 2400 feet on the incline. The vein is from 1 to 1½ feet thick and frequently contains coarse gold. The sulphurets amount to 2½ per cent. The ore is high-grade and for many years averaged $25 per ton.

The veins in the continuation of the Ophir Hill were worked to a depth of a few hundred feet prior to 1870. From then till recent years but little was done. The developments in this vicinity during the last few years, however, are, on the whole, encouraging. The Osborne Hill mine has lately been opened to a depth of 500 feet on the incline, exposing good bodies of high-grade ore. The Osborne Hill vein is from a few inches up to 2½ feet wide, and is characterized by a large amount of arsenical pyrites in the sulphurets, as are also several adjoining veins. Good ore shoots have also been found recently in the Electric and Centennial mines. To the south of the Osborne Hill mine there are several strong and well-defined veins, as shown on the map, but the developments on them are not extensive. The country rock in all these mines is diabase-porphyrite or porphyrite-breccia.

Along the granodiorite contact west of Osborne Hill and about in the continuation of the W. Y. O. D. vein, there are several veins, mostly in granodiorite and dipping east or west. The principal are the Bullion, Alaska and Ben Franklin, from all of which good ore has been extracted, but they have not been worked extensively for many years.

The North Star group of veins has a westerly or northwesterly strike and a flat northerly or southerly dip. The North Star vein, which dips to the north, has long been one of the principal producers of Grass Valley, and is opened by a shaft 2400 feet deep on the incline. The vein is narrow, averaging 1 foot and sometimes closing down entirely. The ore

is of high grade, running from $15 to $50 per ton, and carries 4 per cent of sulphurets (pyrites and galena) with an average value of $53 per ton. The country rock is a porphyritic diabase. The production for 1893 was about $356,000; considerably less, however, was produced in 1894. Roughly parallel to the North Star vein is the New York Hill vein, opened to a depth of 500 or 600 feet by the New York Hill and Chevanne shafts. This vein, also in diabase-porphyrite, averages 15 inches in width. The ore averages $40 per ton, carrying coarse gold and 2 per cent sulphurets of a tenor of $80 per ton. The vein has not been worked during recent years.

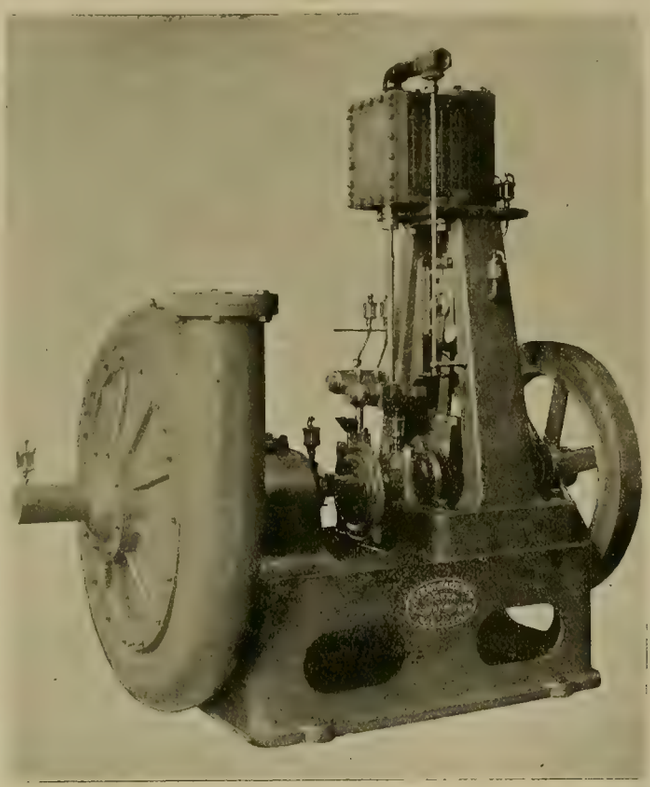
The workings on the New Rocky Bar mine have exposed an interesting, flat vein belonging to the same system, not cropping at all, but forming a flat arch, or "hog's back," as shown in the structure-section sheet.

Outside the limits of the area of the map, but usually considered as belonging to the Grass Valley district, are the veins of Forest Springs. They are located near Wolf creek, four miles south of Grass Valley, the two principal ones being Norambagua and the Slate Ledge. The former is in granodiorite and dips 15° east. The vein averages 9 inches, carrying ore going about $50 per ton, and containing 1½ per cent of sulphurets, chiefly arsenical, worth about $50 per ton. The shaft is 500 feet on the incline and has not been worked much since 1868. It is said to have produced $1,000,000. The Slate Ledge, close by, is in slate and porphyrite, with strike east and west, dip 30° south, and an average width of one foot. The ore contains much arsenical pyrite and is in part very rich.

About four miles west-southwest of Grass Valley, on Deadman's Flat, there are several veins with dips ranging from 30° to 70° west. None of them are opened below 300 feet. The country rock is diorite and amphibolite. The California (Pittsburg Consolidated) shows a narrow vein of high-grade ore with 5 per cent sulphurets. The Seven-Thirty is a little farther south and shows a wider vein of good ore, while the Normandie, to the east of the veins before mentioned, contains two 6-inch veins of high-grade ore.

Pump and Engine.

The pump and engine herewith illustrated was especially designed for the United States Navy Yard dry dock at Mare Island, and is known as Jackson's Whirlpool Centrifugal Pump No. 8, with eight-inch suction and discharge pipe. It is directly connected to the plain slide-valve steam engine cylinder, 9x9 inches; revolutions, 250 to 300 per minute; maximum lift, 30 feet; minimum lift, 10 feet. It is designed to occupy small space, to be convenient to take apart and get inside of the pump without removing any of the working parts. Lubricating cups are arranged for oiling while engine is running, permitting the engine to run an indefinite time without stopping. The makers have recently completed a duplicate compound engine and pump for the Edison Light and Power Company of this city, which pumps all the water for condensing from San Francisco bay to the three power stations, A, B and C, aggregating about 10,000 H. P. The engine and pump are guaranteed to run thirty days and nights, continuously, without showing any signs of distress; the pump to give 600 per cent efficiency, and the engine to consume not more than fourteen pounds of water per indicated horse-power per hour.



WHIRLPOOL CENTRIFUGAL PUMP.

Gold Product '94, '95, '96.

The gold production of the United States for 1896, by States and Territories, according to figures of Director of the Mint Preston, compares with 1895 and 1894 as follows:

	1896.	*1895.*	*1894.*
Alaska	$3,249,000	$2,796,000	$1,113,550
Arizona	2,418,000	1,333,000	1,784,435
California	16,500,000	14,880,000	13,570,397
Colorado	13,000,000	13,120,000	9,491,514
Idaho	2,474,000	1,779,000	2,081,281
Montana	4,440,000	3,888,000	3,651,410
Nevada	2,955,000	1,552,000	1,137,819
New Mexico	525,000	480,000	567,751
Oregon	1,300,000	890,000	1,422,054
South Dakota	4,650,000	3,870,000	3,290,100
Utah	1,920,000	1,370,000	868,031
Washington	382,000	352,000	195,100
Appalachian	306,000	.....	273,072
Totals	$54,119,000	$46,610,000	$39,500,000

Mr. Preston believes 1896 world's gold production will be $215,000,000, an increase of $12,000,000 over 1895. The world's gold production has more than doubled during the last ten years, as production in 1886 was but $106,163,000.

A Modern Surveying Instrument.

Written for the MINING AND SCIENTIFIC PRESS.

For general mining purposes it is essential that the transit should have the following features:

The tripod must by all means be adjustable and light—in fact, the entire instrument should be made with a view to lightness as well as rigidity.

The telescope should be reversible on its horizontal axis.

There should be a complete vertical circle. Do not be content with only an arc. A complete circle is necessary to *properly* run a straight line, because one should reverse the telescope and backsight as well as to revolve the alidade about the vertical axis and backsight. By this method, if properly executed, all instrumental errors are eliminated and observation errors checked.

Stadia wires should be inserted in the telescope for doing topographical work and for measuring distances where chaining is difficult, as over bluffs, across canyons and along steep (sidling) places. But the stadia wires should be adjusted to read from the center of the instrument instead of from the apex of the visual angle. This is practically correct for all distances over 100 feet and is as near right as the average surveyor will chain. If the wires are thus adjusted it is evident that computations involving "c" and "f" are obviated. Some prefer the disappearing stadia wires, i. e., stadia wires that are out of focus when the vertical and horizontal wires are seen and vice versa. It may be as well to add for the benefit of those who do not have much faith in stadia measurements, that measurements quite as accurate as can ordinarily be made with a chain can be made by the following method: Use a rod with two targets, one secure at the top of the rod and one movable lower down. Bring the upper stadia wire upon the top target and place the lower one by the lower wire. The rodman reads the distance from the vernier of the lower target. In ordinary work, however, the transitman reads the distances from an ordinary stadia board.

The next statement will likely be disputed by old surveyors, viz., that the graduations on the horizontal limb should read from 0° to 360° and in direction S. W. N. E. instead of from 0° to 180° each way. This will obviate errors in reading the verniers and give the bearing of the line without the use of letters. Once used, the old way will never be reverted to. Both styles of graduations may be placed on the limb, however, but is *never* necessary and often leads to error by reading the vernier the wrong way. In traverse surveying, on the surface or underground, this style of graduation is especially advantageous, the azimuth being always reckoned from 0° to 360° and read to the minute or to 30 sec., as the case may be, instead of the old way of reading the compass needle to the nearest 15 minutes. Then, instead of using the now almost obsolete traverse table, use tables of logarithmic sines and cosines arranged for the purpose. The work will be infinitely more accurate, especially if long shots be taken.

The level on the telescope should be long and well made, so that the transit may be used instead of a level in many cases.

There should be four leveling screws and a shifting center. Tangent screws are necessary for the vertical circle and horizontal limb.

If a solar attachment is desired, the "Sægmuller" attachment should be purchased, as it can be used with a complete vertical circle, has a telescope sight and in every way answers the purposes of a solar compass. A moderate-priced instrument, kept in fine adjustment, will do better work than a high-priced one that has been abused.

Junction, Nevada. O. H. PACKER, M. E.

The Loss to the Farmer Through Debris.

While estimating the losses to the miner from closing the hydraulic mines it is but fair to estimate the loss to the farmer from the debris. The losses have been in three directions.

First—The direct damage to property by debris.

Second—The loss of the product from this property.

Third—The loss to the industries contingent upon this property.

First—*The direct damage to the property by the debris.* The State Engineer* determined that 43,546 acres had suffered depreciation to the amount of $2,597,-634. The United States Engineers† estimate that 53,149 acres have suffered depreciation to the amount of $3,304,035.

Aside from this damage to agricultural lands there has been some damage to the towns of Sacramento and Marysville and damage to navigation. No estimates have been made as to the damage to Sacramento but it has probably been very light.

The following record of assessed value of property at Marysville has been published:

Year.	*Assessed Value.*
1855	$3,354,091
1860	3,823,518
1865	2,350,679
1870	1,844,340
1875	2,106,825
1880	1,703,900‡

Supposing the assessed value to be 50 per cent of the real value the decrease has been about $2,500,-000. Marysville was at one time the gateway to the Yuba mines but the railroad to Grass Valley robbed her of her prestige so that property values would probably have decreased had never a pound of debris filled the river.

Second—*The loss of product from ruined lands.* The lands covered by debris have not been entirely ruined nor their product entirely ceased. Estimating the annual product from such lands not covered by debris at $40 per acre, and that the damage began in 1865 and gradually increased until 1880, the total possible product from lands destroyed up to 1896 could not exceed $35,000,000.

Third—*Loss to sympathetic industries.* The capital contingent to handling a product of $1,750,000 annually of farm produce would not exceed twice the amount of production, or $3,500,000. Supposing this capital to be entirely lost, although the industries contingent to agricultural products are probably less dependent upon any one locality or industry than those dependent upon mining, we therefore have a total loss of about $45,000,000 in round numbers.

In addition to these losses, there has been the extra expense imposed upon residents of the Sacramento valley from the extra diking due to debris and the extra cost of reclaiming lands. But some lands have been benefited by the slickens and others benefited by the higher moisture level due to a higher river and flood surface. A question often considered is: What is the maximum amount of damage possible from the mines? State Engineer Hall estimated the area of the Sacramento valley as follows:

	Square Miles.
High hill lands (Marysville Buttes)	55.50
Low hill or rolling lands	650.00
Dry plains above overflow	2,331.45
Dry plains subject to occasional overflow	450.00
Swamp lands subject to overflow, lands covered by debris, etc	1,254.00
River and slough surface	38.05
Total	4,769.00 §

The lands subject to occasional overflow cannot but be benefited by a higher river level and a consequent higher level of moisture. The lands are so far back from the river as to receive no sands, and the clayey slickens do more good than harm. The area subject to yearly overflow is, therefore, the area through which damage will result. This area is estimated at 1254 square miles, or 802,560 acres; if valued at $40 per acre, would amount to $40,128,000.

Supposing the annual washings from the hydraulic mines were to continue at the rate of 1880, and that 10% of excavated material found lodgment in this flood plain, it would require over 300 years to cover this plain one foot deep.

It will be seen from the table of estimated debris resting in California drainage channels that but 8% of the total debris lies in the Sacramento and in the Feather river below Marysville. But it was shown that but one-fourth of this debris comes from the mines; in other words, one-fiftieth of the debris excavated from the mines finds lodgment in this channel. At the rate of annual washing in 1880, the channel would be raised one foot in 38 years.

*Annual Rep. State Engineer, 1880, Part III.
†Annual Rep. Chief of Engineers, 1891.
‡Rept. State Engineer, 1880, Part III, p. 19.
§ Annual Report State Engineer, 1880, Part III, p. 7.

The Solution and Precipitation of the Cyanide of Gold.*

NUMBER VI.

By S. B. CHRISTY, Professor of Mining and Metallurgy, University of California, Berkeley, Cal.

7. *The Precipitation of Gold from Cyanide Solutions by Means of Metallic Zinc.*

The precipitation of gold from cyanide solutions by means of zinc-shavings has been more generally used on the large scale than any other. It appears on the face of it the simplest method that could be devised, and in proper hands and under intelligent supervision it has given, on the whole, better results than any other method in general use. Nevertheless, those who have used it most are the most anxious to find some other method.

Some of the principal objections urged against it are the following:

1. The great consumption of zinc compared with the amount of gold precipitated.
2. The great destruction of potassium cyanide to no useful purpose.
3. The great difficulty of removing zinc and cyanogen residues from the gold, thus causing loss in melting and the production of an unclean bullion.
4. The failure, in certain cases, to precipitate the gold.

I do not need to dwell on the first three of these difficulties. They have been sufficiently emphasized by every one who has described the practical application of the cyanide process; but the incomplete precipitation of the gold has not been sufficiently recognized.

One reason for this appears to be that the reaction which takes place when gold is precipitated from the potassium-aurocyanide is not as simple as it is generally supposed to be. Thus Dr. Scheidell, in the *Bulletin* of the California State Mining Bureau, on the "Cyanide Process," 1894, p. 34, states the usually accepted view. He says:

"The action of zinc on gold solution is theoretically very simple, a simple substitution of the gold by the zinc according to the equation:

$$2AuKCy_2+Zn=K_2ZnCy_4+2Au."$$

This reaction had also been given in almost the same words by Butters and Clennell (*Eng. and Min. Journal*, Oct. 29, 1892). Wilson ("Cyanide Process," p. 34) and Rose ("Metallurgy of Gold," p. 323) adopt the same reaction.

My attention was first called to this subject by a remark of Mr. W. R. Feldtmann (*Eng. and Min. Journal*, August 11, 1894), who, speaking of the precipitation of gold by zinc, says:

"Its completeness appears to depend, in a measure, on a slight excess of cyanide of potassium being present in the solution."

The same fact was recognized by one of my students, Mr. B. E. James, when acting as assayer at the Mercur mine, Utah (MINING AND SCIENTIFIC PRESS, May 23, 1896).

This led me to investigate the reaction which occurs. I had prepared a solution of potassium aurocyanide with about 1.3 per cent metallic gold and no free cyanide. A solution made from this by dilution, so as to contain 0.1 per cent, or $603 per ton, gold, was then treated with strips of sheet zinc for twenty-four hours. The strips were carefully burnished with emery paper, or with a sharp knife, to avoid any film being left on the surface of the zinc. Commercial sheet zinc was used, as is done in practice. The solution was contained in glass tubes, sometimes at rest, sometimes rotated mechanically for the whole period of twenty-four hours.

In no case was more than a trace of gold precipitated. In many cases, where the zinc was brightly burnished, not a trace of gold came down, and the strips weighed exactly the same to a hundredth of a milligramme before and after the test, and when dissolved in sulphuric acid left no trace of gold.

These experiments throw light on the statements often made that it has been possible to extract the gold from the ore but not from the solution. A person trusting to the above-described reaction might easily throw away such a solution after twenty-four hours' contact with bright metallic zinc, even though it contained $603 per ton.

The next experiments were made with lathe turnings from the same sheet zinc which, in the polished state, had failed to precipitate gold. With potassium aurocyanide containing 0.1 per cent, or $603 gold, per ton, which had failed to precipitate at all on the bright sheet zinc, the gold was entirely precipitated from the solution in twenty-four hours by filtering it through a very large excess of zinc shavings (over four hundred times the weight of the gold present). The filtrations were repeated through the same shavings four times.

When the solution contained only $10 worth of gold per ton, the precipitation was only 82 per cent of the gold in solution in a single filtration which lasted twenty-four hours. In each case the solution was allowed to remain in contact with zinc shavings, four hundred times the weight of the gold in solution, until a color of gold appeared on the shavings; then the solution was allowed to flow from the filter drop by drop, the shavings being continuously submerged. The conditions were, therefore, much more favorable for complete precipitation than could be maintained in practice.

These differing results are very difficult to explain on the simple substitution reaction usually accepted. If the gold precipitates on the shavings, why should it not do so on the same sheet of burnished zinc from which the shavings were made? There is a larger surface of contact, it may be suggested. But even the smallest fragment of a zinc shaving will precipitate gold on itself, while, in the same solution the freshly scraped surface of sheet zinc, many times its area, is entirely or practically without action. It may be thought that the turnings had a cleaner surface than the scraped zinc, but this cause was carefully eliminated.

All the indications point to the phenomena of "polarization," so well known in electrolytic work, where the formation of invisible traces of films on the surface puts a stop to further action, either by preventing contact, or by setting up an opposite electromotive force.

I have not had time to establish firmly the following explanation of the phenomena which I have observed, but there seems some evidence in its favor.

There is no doubt that, besides the tendency of the potassium-aurocyanide to split up into KCy and Au and Cy, which is assumed in the reaction by substitution, there is also a tendency for it to split along another line, viz., into K and $AuCy_2$, the latter playing the part of an acid-radical. Now, if this takes place in the presence of zinc and water, the water will be attacked by the potassium, forming caustic potash and hydrogen, and the $AuCy_2$ will be attacked by the zinc, forming zinc-cyanide and metallic gold, according to the following reaction:

$$2KAuCy_2+2Zn+2H_2O=2ZnCy_2+2KHO+2H=2Au.$$

There is no doubt that a certain tendency to form this reaction exists, for electrolysis proves it. It can only take place here by setting up a condition of polarization on the surface of the zinc, owing to the film of occluded hydrogen set free on its surface. If this be so, it is now very clear why the zinc turnings act, while the smooth zinc does not. The turnings have an infinite number of ragged edges, which favor the escape of the hydrogen gas, and the relief of the condition of polarization, and thus allow the reaction to proceed. The hard, smooth surface of the rolled sheet zinc is very unfavorable to the formation of gas bubbles from its surface, and hence to the continuation of the reaction.

Of course, when the reaction once sets in as above, there is a further reaction between the caustic potash and the zinc cyanide, by which a part of the latter is dissolved, and potassium zinc cyanide and potassium zincate formed. Thus:

$$2ZnCy_2+4KHO=ZnCy_2,2KCy+ZnK_2O_2+2H_2O,$$

as already pointed out by Mr. J. S. C. Wells in a valuable paper (*Eng. and Min. Journal*, December 21, 1895). The complete reaction would then be:

$$4KAuCy_2+4Zn+2H_2O=2ZnCy_2+ZnCy_2,2KCy+ZnK_2O_2+4H+4Au.$$

The turning point would seem to be: Is hydrogen formed as these reactions require, or is it absent, as called for by the substitution reaction? Numerous experiments have always shown that by the action of a solution of potassium aurocyanide containing only 50 mgs. of gold and zinc turnings, hydrogen gas is set free in sufficient quantity to give a well defined flame (4 or 5 c.c.). The hydrogen does not form in noticeable quantity at first; but, as the gold begins to come down, on shaking the zinc turnings, fine bubbles of gas escape, and may be easily collected in quantity. It may be objected that the replacement reaction took place, and that the hydrogen was evolved by the subsequent reaction of the $2KCy,ZnCy_2$ on the zinc. Experiment shows that the double cyanide of zinc and potassium acts very slightly on zinc shavings, but that when the latter have been partly plated with gold, hydrogen is then set free. So that the presence of hydrogen at the end of the reaction may be due to this cause, at least in part. It is also probable that the nascent hydrogen is, in part, absorbed by the solution with the formation of methylamine:

$$HCN+2H_2=CH_3NH_2,$$

the HCN being formed by the partial dissociation of the dilute cyanide solution by "hydrolysis."

$$KCN+H_2O=KHO+HCN.$$

Another curious fact remains to be recorded. When zinc turnings are placed in distilled water containing a drop of phenolpthalein no coloration takes place. When phenolpthalein is added to pure potassium aurocyanide, no coloration takes place. This shows the aurocyanide to be but little dissociated. When the latter solution is poured upon the former, at first no change occurs; but, as the gold begins to separate upon the zinc, a deep purple stain surrounds the zinc turnings where the gold has separated out, showing that the reaction has become alkaline. Whether this is due to the formation of caustic potash, methylamine, or the double cyanide of zinc and potassium, I have not demonstrated with certainty. The fact, however, that zinc cyanide seems to separate out early in the reaction, indicates the reaction I have suggested.

Yet another point remains to be mentioned. When to a solution of potassium-aurocyanide which has been left for twenty-four hours in contact with zinc strips, without action, a little free cyanide of potassium is added, the gold comes down at once and the precipitation is soon complete. This fact seems an additional confirmation of the reaction that I have suggested. It will be remembered that the formation of the insoluble cyanide of zinc is a feature of this reaction. If this occurs it is certain that a film of this substance, perhaps infinitely thin, must cover the surface of the zinc, and, in addition to the film of hydrogen, prevents the contact necessary to continue the reaction. The presence of free cyanide of potassium, of course, readily dissolves this film, and the reaction is free to continue.

The reaction which actually takes place in precipitating gold from solutions containing free cyanide of potassium will then be something like this:

$$2KAuCy_2+3Zn+4KCy+2H_2O=2Au+2(ZnCy_2 2KCy)+ZnK_2O_2+4H.$$

It will be remembered that according to the substitution reaction one atom of zinc replaces two atoms of gold, or 1 ounce of zinc should precipitate 6.2 ounces of gold; whereas, as every one knows in practice, 1 ounce of zinc will precipitate only from $\frac{1}{5}$ to $\frac{1}{15}$ of an ounce of gold, or thirty to ninety times less than the amount called for by the reaction by substitution. According to the reactions I have suggested, in the absence of free cyanide of potassium and caustic potash 1 ounce of zinc should precipitate 3.1 ounces of gold. In the presence of a moderate excess of cyanide of potassium it should precipitate 2.06 ounces. The apparent discrepancy that seems still to remain between theory and practice is in reality due to the facts: first, that the free alkali (potash in particular, formed in the solution of the gold, or added to neutralize the free acid in the ore) also dissolves the zinc as potassium zincate; second, that an excess of potassium cyanide dissolves the zinc on its own account, both as the double cyanide and as the zincate of potassium; third, it should also be remembered that water containing dissolved oxygen attacks metallic zinc quite vigorously, forming hydrate of zinc.

I do not consider the reactions which I have suggested as demonstrated. I have considerable work outlined on this subject which is not yet finished, and the opinions here expressed are provisional. It is not improbable that the reaction by replacement and the more complicated one that I have suggested may both take place under certain conditions of concentration and temperature which are not yet understood. It is also possible that the nature of the reaction changes after the first deposit of gold.*

However the theory of this subject may finally turn out, and even granting that, given indefinite time and zinc-shavings, it may be possible to remove all the gold from an aurocyanide solution in the absence of free cyanide of potassium, it is still practically true that it is impossible to remove all the gold from a cyanide solution in a reasonable time, say twenty-four hours, unless there is an excess of about $\frac{1}{10}$ or $\frac{2}{10}$ of 1 per cent of free cyanide of potassium. This is all the more necessary in large scale work, as fine ore-silt and the oxidizing effect of dissolved oxygen nearly always leave the shavings in the zinc boxes more or less coated with films, which increases the difficulty of an intimate contact of the solution with metallic zinc.

*Mr. Alfred James in a valuable paper on "Cyanide Practice" read before the Institution of Mining and Metallurgy, London, May 25th, 1895, calls attention to the inadequacy of the substitution reaction in explaining the precipitation of gold in the zinc boxes. He doubts the action of KCy on the zinc, to any appreciable extent, and calls attention to the fact (as per Ellsner's reaction:

$$2Au+4KCy+H_2O+O=2KAuCy_2+2KHO)$$

that KHO is always present in the cyanide solution. He then suggests the following reaction in explanation of the precipitation of gold in the zinc boxes:

$$(a)\quad Zn+2KHO=K_2ZnO_2+2H;$$

"then as Feldtman has pointed out, the nascent hydrogen reduces the gold,"

$$(b)\quad 2KAuCy_2+2H=2KCy+2HCy+2Au;$$

then he adds that a subsequent reaction takes place as follows:

$$(c)\quad 2KCy+2HCy+K_2ZnO_2=ZnK_2Cy_4+2KHO.$$

When we come to study these reactions, however, it must be evident that we may combine reactions (*a*), (*b*), (*c*), into one reaction, for they really occur simultaneously. We have then:

$$(d)\ 2KAuCy_2+2KHO+Zn=2Au+ZnK_2Cy_4+2KHO.$$

It must be further plain that if we subtract the 2KHO (which appears unchanged in this reaction) from both members of equation we have (*d*):

$$(e)\quad 2KAuCy_2+Zn=2Au+ZnK_2Cy_4.$$

In short, it appears that the explanation of Mr. James brings us back to the old substitution reaction which he started out to avoid. His reactions also fail to explain the increase of free alkali which everyone recognizes as taking place in the zinc boxes.

(To be Continued.)

*Colorado meeting American Institute of Mining Engineers, Sept., 1896. (Revised Proofs Dec. '96.)

Scientific Progress.

Measuring the Earth.

An arc 3000 miles in length, which has been in process of measurement by triangulation for a period of over thirty years, showing the curvature of the earth's surface on this hemisphere, was completed by the United States Coast and Geodetic Survey last month.

The enterprise was inaugurated by President Jefferson in 1807, but no active progress in pushing it was recorded for many years later. Since 1874, several parties of civil engineers have been at work almost steadily between the Atlantic and Pacific coasts, making the triangulations for the big arc, under the direct supervision of the different coast and geodetic survey superintendents. These earth measures worked in general line toward one another from both sides of the continent. About the middle of the month the two base lines from which the closing calculations have been made were verified. One was drawn in the State of Kansas, and the other in Salt Lake valley, Utah.

P. A. Welcker, of the Survey, speaking of the work says that the general purpose in measuring an arc across the American continent is primarily to get the true curvature of the earth on this hemisphere. An accurate survey, something that was never before reached, is also desired. Surveys are generally made on the basis that the surface of the earth is flat.

This country is co-operating with all the other civilized countries for the common purpose of getting a new figure of the earth established to supersede the figure now in use. Bessel's ellipsoid, the first figure of the earth used by scientists, was established from data collected by the Germans. The next ellipsoid—the one now accepted—was established by Clarke, an Englishman.

In 1874 an international agreement was reached among the civilized nations to take measurements for another ellipsoid—one that will be practically true. Every Government of consequence in the world has since been engaged in measuring out an arc on the surface of the globe. The arc in this country is the longest measured by any one nation.

All surveys in this country are to be corrected by the arc measured out from the Atlantic to the Pacific. The ordinary surveys are inaccurate, as the surveying engineers do not allow for the curvature of the earth. In surveying a State, they measure from county to county, and the consequence is that the surveys thus made overlap each other.

Two years ago the connections between the Eastern and Western parties of engineers were made at Mount Ebert and Ouray.

A longer arc than ours is the one measured conjointly by England, Germany and Russia. These countries combined on one arc and France and Spain on another. The English have also done a good deal of triangulation measuring in India.

It will probably be a year before the calculations are all completed and a true figure of the earth is established. The arc in this country will be combined with all the others established over the globe and the mean curvature of the earth's surface thus obtained. It is expected that the triangulation calculations, combined with the use of the pendulum, will give us the length of the earth's diameter to a degree of accuracy within a possible difference of 50 feet from the exact diameter.

In taking measurements here the engineers first strike a straight line from five to seven miles in length. This is their base line. From this base the engineers then spread out with triangles and quadrilaterals, so as to reach lines of twenty-five miles. From figures they spread out into lines running from 100 to 190 miles in length.

In connection with the work of triangulation just finished, another party of Coast and Geodetic Survey engineers have been engaged in running a line of levels across the American continent. This latter is being done for the purpose of accurately establishing altitudes. These had heretofore been fixed chiefly by the railroad companies. The line of levels will run from Sandy Hook, N. Y., to San Francisco. It took over thirty years' work in making tide observations on the Atlantic and Pacific to get true sea levels as a preliminary to the altitude survey. The line of levels has reached Kansas from the New York end, where operations on it were suspended about two months ago.

Determining of Carbon in Iron.

Engineer Peipers of Remscheid has introduced a method of determining carbon in steel similar in principle to the assay by touch in use for gold. A series of test bars of known carbon contents, and varying from each other by about 0.2 per cent, between the limits 0.2 per cent and 1.2 per cent, form the touch needles, while touch stone is represented by a slab of hard biscuit porcelain. The bar is hammered and filed to a blunt conical point, which leaves a black mark when rubbed on the porcelain slab. The sample to be examined is rubbed upon the center of the plate, to form a patch of about the breadth and length of the finger, a similar one being made on either side of it with two of the bars whose composition is known. The chief point to be attended to is to make the patches uniform in depth of tint, which can be readily done with a little practice. The marked slab is then immersed to about half its depth in a breaker containing 12½ per cent solution of copper-ammonium chloride in water, which dissolves away the iron, leaving the carbon behind as a gray stain, whose intensity increases with the percentage proportion. Steel with about 1½ per cent of carbon is nearly as dark after as before immersion, while that with 0.25 gives only a very pale shade when the iron is removed. If the metal were perfectly free from carbon, the mark would be completely dissolved.

Numerous substances have been tried for streak-plates, including agate, hard glass and feldspar, but none of them has been found equal to unglazed porcelain. In its ordinary state, however, the latter is too rough to abrade the metal equally. It must be rubbed down with coarse emery cloth to render the surface sufficiently uniform. The markings may be nearly completely removed by washing in water, but a more satisfactory method is to clean the slab by immersion for fifteen minutes in nitric or hydrochloric acid, which removes rust spots and stains and restores the original white surface. The method is capable of indicating differences of 0.05 per cent or 0.025 per cent of carbon under favorable conditions.

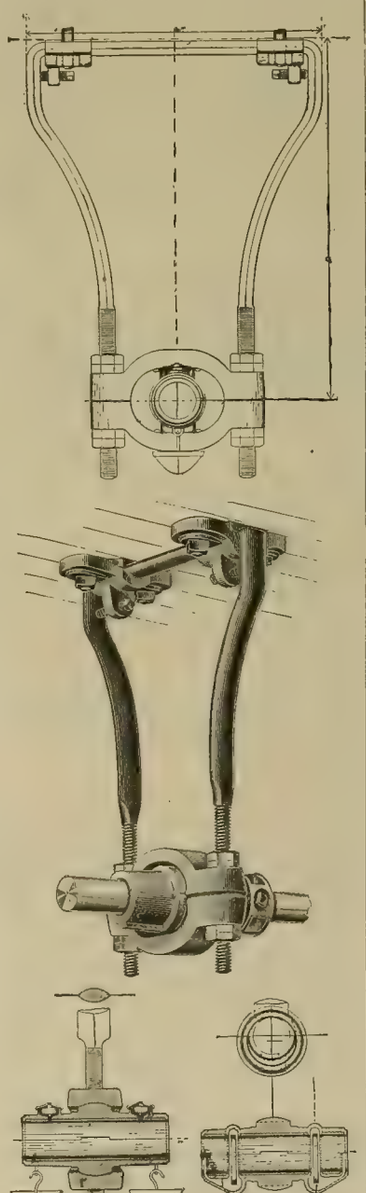
Changes in the Elasticity of Iron.

Wrought iron and steel are more apt to tear and to break than was supposed generally in former times. It has to suffer from exterior influences, as wear and tear, shock, tension and rust. A piano string of 1-10 inch thickness can stand a burden of up to 500 pounds without breaking, but bent several times in different directions it would lose one-half of its carrying power. By the sharp bending the small crystals of the original structure of the iron have changed position, and thus lost their hold in each other. Iron and steel remain crystalline substances, which fact cannot be altered by any chemical process. As another example we could take the axle of a locomotive, which is manufactured to stand eight to ten times as much wear as is ordinarily demanded of it. Yet after a shorter or longer time of use it will break suddenly by reason of the continual shocks and jolts to which it is subjected, for iron has the property to return to its original state when exposed to shocks; it loses in elasticity, and, finally, it breaks. As wrought iron suffers greatly from changes of temperature, expanding in heat and contracting in cold, defects in bridges and other structures arise. All these structures are exposed to wind and weather; while in the day time the iron parts are heated by the rays of the sun, at night they cool off quickly. As iron is very sensitive, a continual difference of length is caused in the traverses and diagonals, riveted and bolted together as solidly as possible; the original length is never accurately recovered, but the crystalline structure of the iron parts is loosened gradually; the shocks caused by the traffic over a bridge are yet to be added. Iron bridges, therefore, should be carefully examined from time to time, and worn-out parts replaced immediately by new ones. Finally, a fourth example may be cited. The chain of a crane in a covered room, which is not exposed to rust-creating humidity and is warranted to carry a burden of 500 pounds, may, after years of use, break suddenly while carrying only one-half that burden. In carrying a load the links of the chain have the tendency to contract in the middle, and a certain tension is caused, by which the crystalline and apparently fibrous structure of the links is destroyed, which may easily be the cause of serious accidents if the chain is not examined at certain intervals.—American Manufacturer.

Mechanical Progress.

Steel Frame Hangers.

Herewith are illustrated Giant steel frame hangers, as manufactured by



Cup-Oiling Bearing. Self-Oiling Bearing.

the J. B. Johnson Co., Gouverneur, N. Y., constructed upon lines calculated to insure maximum strength of material employed, and of a character possessing high resistance to the strains subjected to in use, avoiding unnecessary weight upon the timbers to which the shafting is attached.

Lubricating Oils.

In an address to the Association of Mechanical Engineers at their recent meeting in Providence Mr. George R. Babbitt said that previous to the discovery of petroleum, fish oils were more generally used for lubricating than any other. About thirty-three years ago petroleum began to be produced in large quantities, but the world was slow to realize its value. There are few places where one cannot get better results with mineral oil than sperm oil. At the time sperm was generally used in cotton mills the spindles ran about 3000 or 4000 turns a minute, while now the speed is from 8000 to 10,000. The lubricant should be adapted to the nature of work to be done. A very heavy, slow running bearing requires an oil of density and high in viscosity, and a high fire test. Heavy quick running bearings are best lubricated by oils of lighter gravity and high in viscosity. Light and quick running bearings are best lubricated by oils of light gravity and low viscosity. The lighter gravity of oils are subject to evaporation, which may result in making them worthless. The animal oils are produced by being pressed from lard, tallow and cattle hoofs. Winter pressed oil means that the material from which the oils are to be pressed is first chilled with ice or mechanical refrigeration, making it clear of stearine matter. This process reduces the quantity of oil that can be pressed from the animal material, and consequently the oil costs more than that known as weather made oils. Animal oils range from 23 to 24 gravity Baume at 60° F., and are very low in viscosity as compared to mineral oils of the same gravity. When crude oil is taken from the ground it is of a dark red color, but in a mass it looks black or green. The oils from Pennsylvania and West Virginia are the best for lubrication. The best spindle oils are prepared by filtering through bone charcoal. The cheaper lubricating oils are made clear by the parafe or acid process. Paraffine oils, on account of the acids used, stain fabrics. Bone filtered oils are first distilled to the desired gravity, and then percolated through the bone charcoal, placed in a series of pans contained in an upright cylinder. The first oil passing through is white, but as the charcoal absorbs the coloring matter in the oil, the oil begins to show color, light at first and darker afterwards. To make clear oils the charcoal must be changed each time, and they are, therefore, more expensive. They are used when the fabric manufactured on the machinery is to be bleached or dyed in delicate shades. Petroleum lubricating oils range from 22 to 40 gravity Baume at 60° F., the flash being from 300 to 400° F., and their cold test from zero to 35. Cylinder oils are made from the crude after the lighter or more volatile products have been taken out. The gravity of cylinder oils ranges from 25 to 28° Baume, the flash point from 450 to 580° F., and the cold test from 30 to 60° F. Experience has taught that a combination of mineral and animal oils makes the best cylinder lubricant.

Japanese Secret Alloys.

The following is the composition, according to the *Iron Industry Gazette*, of a number of Japanese alloys, hitherto kept a close secret, and now revealed by workmen engaged in making them: The "shadko" is an alloy of copper and from 1 to 10 per cent of gold. The objects are placed in a mordant of sulphate of copper alum and verdigris until they have assumed the coppered or blue-black hue of swordsheaths and decorative articles. "Gni-shi-bu-ichi" is a copper alloy with 30 or 50 per cent of silver of the well-known gray color. "Mokume" is a compound of several alloys. About thirty plates or foils of gold, "shadko," copper, silver and the

last-mentioned alloy are soldered together, holes are made, the plate hammered out and put in the mordant.

The finest Japanese brass, "sinchu," consists of 10 parts copper and 5 of zinc. Bell metals, "karakane," are made of 10 parts of copper, 4 tin, ½ iron, 1½ zinc, the copper being melted first, and the other metals added in the above order.

Electrical Progress.

Electric Traction Under Steam Railway Conditions.

In a general way it may be stated that the only methods of electric traction that have so far demonstrated their ability to perform such work as would be required on surface steam railroads are some modification of the much-abused trolley system, said H. M. Brinkerhoff before the American Institute of Electrical Engineers at Chicago. This may take the form of an overhead contact or of a third rail; but the principle of a continous conductor fed from a central station with a direct current of from 500 to 700 volts is common to all.

We have an example of the overhead arrangement on a large scale in the Baltimore & Ohio tunnel equipment at Baltimore. There they are hauling probably the heaviest train units ever successfully handled electrically, and are in fact doing the work of the largest steam locomotives under strictly steam railway conditions. This, of course, does not allow of the best economy being obtained, but it demonstrates the ability of electric motors to do even this extremely heavy class of work.

In order to supply the large amount of current required on this system the overhead contact arrangement used is necessarily heavy and hence expensive. The cost of this particular form must be so high as to make it unavailable for lines of any great length.

The N. Y., N. H. & H. R. R., on their Nantasket Beach line have successfully operated an overhead system. The difficulty experienced here was, I believe, in keeping the trolley on at high speeds, and that this, with other considerations, has proved a drawback is emphasized by the fact that this road is now experimenting with a third rail system.

Other companies might be mentioned who are running lines with a few cars as they say, "experimentally." These, however, are sufficient to show that a genuine effort is being made by steam railway managers to get at the facts as to whether there is any economy to be gained by the substitution of electricity for steam on some of their lines.

In a general way I do not see that there are any insurmountable obstacles in the way of installing an electric system on surface steam railroads following either the line of an overhead or third rail system.

With such experience as we now have, by giving proper consideration to details and the requirements of the service, we should be able to design a system that would give very satisfactory results.

The question whether it should be a third rail, overhead or storage battery, is simply a matter to be decided by the conditions on the particular system considered, and a careful estimate of first cost and maintenance.

Extracting Ore by Magnetism.

Daily press accounts of the Edison process of extracting iron ore by magnetism, as in operation at the plant in New Jersey, give the following:

There are three sets of the magnets—74 in the first set, 320 in the second, and 320 more in the third set. The magnets are about 4 feet long, and the ore, on its journeyings, has to pass a mile of faces of magnets. Right here is presented what to the layman is a most remarkable feature of the process. The magnets are arranged in tiers of five in a tier. The top one is weak, but they increase in strength as they go down, until the bottom one is very powerful.

The ground rock passes through the screen and starts downward in front of the magnets. The magnets jerk the particles of iron oxide from the mass as they descend, but the iron does not adhere to the magnets. And right here is a most surprising sight. The ore, in passing the first magnet, inclines toward it. As it rushes down, the ore swings in more toward the magnets, until, as it reaches the last one, it curves inward and under it in a half-circle, without any particle of ore adhering to the magnet.

In the first passage past the magnets, small quantities of stone stick to the ore. The ore is carried upward and started down before the second lot of magnets, after passing through a mill, which grinds off the particles of stone. The first set of magnets extract 62 per cent of oxide of iron. When the mass has passed the second set of magnets, there is in it 75 per cent of oxide of iron. Then it is ground again and passes the third and most powerful set of magnets, which takes the phosphates out and makes Bessemer of it.

Electricity in Surgery.

A Cincinnati surgeon has constructed and tested what is known as a cataphoresis outfit, by which anesthesia is produced by an electric current and a surface application of some one of the well-known anesthetics. By means of it a loss of feeling in the member operated on is produced without the loss of consciousness or the danger attendant upon the use of ether or chloroform. One may witness the surgical or dental operation and be entirely free from pain during it. The invention is founded on what is stated as a well-known fact, viz: That an electric current will tend to carry a substance from the positive to the negative pole. This is the principle made use of in electro-plating, and it is the same that is made use of in his new apparatus. All that is necessary to accomplish the desired results, says a description of the apparatus, is that the subject that is to undergo an operation shall be charged with electricity from the negative electrode of a battery. An application to the affected part, a tooth, for example, is then made of cocaine or other drug, and the positive electrode, consisting, in the case of the treatment of a tooth, of a needle, is then brought in contact with that part to which the drug is applied. The current then finishes the work by carrying the anesthetic into the tissue or into the nerve of the tooth, rendering the nerve completely insensible. As long as the electricity is applied, the current will flow from the positive to the negative electrode, and with it will be carried the drug to whatever extent is required. The effect will last according to the strength of the current, the time of application, the amount of the drug, and many other conditions, it being entirely dependent upon such known qualities that, with the successful regulation of the current, the exact result of the application can be foreknown.

ACCORDING to the London *Electrical Review* an interesting process is now being conducted at Charlottenberg, Germany, by M. Mehner, by means of which ammonia and nitrides are produced. Oxygen compounds of such elements as boron, silicon, magnesium, titanium and vanadium, capable of combining with nitrogen at high temperature, are exposed to the heat of an electric farnace in the presence of free nitrogen and carbon. A high tension current must be employed and a jet of sand blown in whilst generator gas is introduced; on entering the hot zone of the electric furnace the sand is said to evaporate and then acts as desired. Nitrides thus manufactured may be treated with steam to obtain the ammonia and an oxide from which a nitride may be re-formed as before.

THE use of electricity has called 13,117 patents into existence in the way of generation; 2019 in electrical railways, and 141 in electric brakes.

Practical Information.

Metric Conversion Table.

The following metric conversion table, which has been compiled by C. W. Hunt, could be with advantage pasted by engineers in their note books:

Millimeters multiplied by .03937 equals inches.
Millimeters divided by 25.4 equals inches.
Centimeters multiplied by .3937 equals inches.
Centimeters divided by 2.54 equals inches.
Meters equals 39.37 inches. (Act of Congress.)
Meters multiplied by 3.281 equals feet.
Meters multiplied by 1.094 equals yards.
Kilometers multiplied by .621 equals miles.
Kilometers divided by 1.0093 equals miles.
Kilometers multiplied by 3280.7 equals feet.
Square millimeters multiplied by .0155 equals square inches.
Square millimeters divided by 645.1 equals square inches.
Square centimeters multiplied by .155 equals square inches.
Square centimeters divided by 6.451 equals square inches.
Square meters multiplied by 10.764 equals square feet.
Square kilometers multiplied by 247.1 equals acres.
Hectares multiplied by 2.471 equals acres.
Cubic centimeters divided by 16 383 equals cubic inches.
Cubic centimeters divided by 3.69 equals fluid drachms (U. S. P.).
Cubic centimeters divided by 29.57 equals fluid ounces (U. S. P.).
Cubic meters multiplied by 35.315 equals cubic feet.
Cubic meters multiplied by 1.308 equals cubic yards.
Cubic meters multiplied by 264.2 equals gallons (231 cubic inches).
Liters multiplied by 61.022 equals cubic inches. (Act of Congress.)
Liters multiplied by 33.84 equals fluid ounces (U. S. P.).
Liters multiplied by .2642 equals gallons (231 cubic inches).
Liters divided by 3.78 equals gallons (231 cubic inches).
Liters divided by 28.316 equals cubic feet.
Hectoliters multiplied by 3.531 equals cubic feet.
Hetoliters multiplied by 2.84 equals bushels (2150.42 cubic inches).
Hectoliters multiplied by .131 equals cubic yards.
Hectoliters divided by 20.42 equals gallons (231 cubic inches).
Grammes multiplied by 15.432 equals grains. (Act of Congress.)
Grammes multiplied by 981 equals dynes.
Grammes (water) divided by 29.57 equals fluid ounces.
Grammes divided by 28.35 equals ounces avoirdupois.
Grammes per cubic cent. divided by 27.7 equals pounds per cubic inch.
Joule multiplied by .7373 equals foot pounds.
Kilograms multiplied by 2.2046 equals pounds.
Kilograms multiplied by 35.3 equals ounces avoirdupois.
Kilograms divided by 1102.3 equals tons (2000 pounds).
Kilograms per square cent. multiplied by 14.223 equals pounds per square inch.
Kilogrammeters multiplied by 7.233 equals foot pounds.
Kilograms per meter multiplied by .672 equals pounds per square foot.
Kilograms per cubic meter multiplied by .026 equals per cubic foot.
Kilograms per cheval vapeur multiplied by 2.235 equals pounds per horse power.
Kili-watts multiplied by 1.34 equals horse power.
Watts divided by 746 equals horse power.
Watts divided by .7373 equals foot pounds per second.
Calorie multiplied by 3.968 equals B. T. U.
Cheval vapeur multiplied by .9863 equals horse hower.
(Centigrade multiplied by 1.8) plus 32 equals degrees Fahrenheit.
Francs multiplied by .193 equals dollars.
Gravity, Paris, equals 980.94 cent. per second.

The Deepest Bore-Hole.

The deepest bore-hole in the world, says Mr. C. Zundel, in a late communication to the Industrial Society of Mulhouse, is one of 6571 feet below the surface of the soil, made at Paruschowitz, near Rybrick, Upper Silesia. The previous record for depth was the hole drilled some years ago at Schladebach, near Leipsig. The latter bore-hole was made in a search for coal measures, and 83 separate seams, some of considsiderable thickness, were penetrated. The hole was 12 inches in diameter at the beginning, and this was lined with a tube about 0.4 inch thick; at a depth of 230 feet the bore was reduced to 8¼ inches in diameter, and thus continued for 351 feet. At this point the blue marl encountered became so compact that the diamond drill had to be used, and, under the action of the water, the marl swelled to such a degree that the diameter of the pipe had to be again reduced. The greatest difficulty encountered was the great weight of the boring rods, as the depth increased. Though steel was used, at a depth of 6560 feet the total weight of the tools reached 30,155 pounds. Under this weight, ruptures of the rods were frequent, and an accident of this nature finally stopped the work; about 4500 feet of rods fell to the bottom, and, being jammed under a part of the tubing, it was impossible to withdraw it. The diameter of the well at the bottom was 2¾ inches. Temperature observations made showed 12° C., or 15° F., at the surface, and at the depth of 6571 feet the temperature reached 69.3° C., or 157° F. This is equivalent to an average augmentation of heat of 1° C. for every 34.14 metres of depth, or 1° F. for every 63 feet.

The boring at Paruschowitz was commenced on March 26, 1892, and it reached its maximum depth on May 17, 1893, or in 399 working days. The total cost was $18,800, or about $2.86 per lineal foot.

THOSE who are engaged in foundry practice are apt to consider the cupola and molding room as the chief consumer of iron. Just to show an example of what becomes of some of the millions of tons of iron ore brought to the surface yearly, it may be mentioned that a building now being erected in New York will consume in its construction no less than nine thousand (9000) tons of steel work to form its framework. This is as much as would be required to lay 100 miles of track with 50-pound rails, and shows that if the foundries are not doing much, and railroad is building almost at a standstill, there is still to be found a market for an enormous amount of iron.—The Foundry.

FOUR months ago there was a rule placed in effect on the Galveston, La Porte & Houston railway that hereafter engineers would be compelled to pay for all stock killed by them on that line, and since then the amount paid for dead cattle has not exceeded $20 per month, while heretofore it had amounted to nearly $1200 per month. The officers of the company say that the killing of the stock, in a great measure, is due to the negligence of engineers, and the method adopted by them has proven successful. The same order was placed in effect on a small road in Alabama several years ago.

DR. BOLLINGER, director of the Anatomico-Pathological Institution in Munich asserts that it is very rare to find a normal heart and normal kidneys in an adult resident of that city. The reason for the kidney disease is the tax put upon these organs by the drinking of excessive amounts of beer, and the cardiac hypertrophy and degeneration are secondry lesions for the most part. Formerly, the population of the city was recruited by accessions from the country, but the abuse of beer has spread now to the rural communities, so that this source of healthy new blood is cut off.

A SCIENTIST says that only 900 persons in 1,000,000, according to medical authority, die from old age, while 1200 succumb to gout, 18,400 to measles, 2700 to apoplexy, 7000 to erysipelas, 7500 to consumption, 48,000 to scarlet fever, 25,000 to whooping cough, 30,000 to typhoid and typhus, and 7000 to rheumatism. The averages vary according to locality, but these are considered accurate as regards the population of the globe as a whole.

THE steel umbrella frame has almost superseded the old wooden one, but it has one drawback. If the owner of such an umbrella should be carrying his steel frame in the vicinity of the electric light or trolley wire and should happen to touch the wire with the steel point of the umbrella, he would receive the full force of whatever charge the wire carried in his arm.

WHILE paper is being used for dozens of purposes formerly monopolized by wood, or even a harder material, such as car wheels, boxes, barrels, tubs, pails, etc., wood is rapidly driving other ingredients to the wall in the manufacture of nearly all the cheaper grades of paper.

Subscribers and Advertisers.

Many years ago the writer, in conversation with the proprietor of a trade journal in this city, suggested that new subscribers should be secured. "Damn the subscribers," was the answer; "the advertisers are the fellows I'm after." That trade journal is dead. No man will advertise unless he gets satisfactory answer thereto, and a paper that is valueless to advertisers is equally worthless to readers.

In assuming business management of the MINING AND SCIENTIFIC PRESS it was believed that the best business policy would be to let the advertisers alone, assuming that they best understood their own business, and to direct the greatest effort to increase the circulation of the paper. An advertisement is of value only when seen by men most likely to be customers. A trade announcement as sometimes printed in a paper published apparently only for private distribution among a few competitors is of no value. On the other hand, to make a paper of value to advertisers by securing subscribers by the thousand, it must be made of sufficient interest and value to induce those thousands to subscribe for it for the news and information it contains. Hence with the one idea in view to increase the subscription of the paper solely on its merits, and without resorting to any meretricious schemes or inducements, a systematic effort for the last two years has resulted in an enormous increase in the circulation of the MINING AND SCIENTIFIC PRESS. Of course this has cost considerable money which was not spent in soliciting subscriptions, but in making a paper that men want for its value to them, and not for the sake of any proffered "premium" or because the paper was forced on them. How well this idea has succeeded is illustrated by the increase noted above.

Following is a list of new subscribers received in twenty-one days—from Dec. 5, '96 to Dec. 26, '96:

CALIFORNIA.

Pacific Coast Oil Co., Mills Bldg., S. F.
C. M. Cross, No. 101 Sansome St., S. F.
H. P. Monson, 560 Howard St., S. F.
J. Spaulding, Auburn.
C. Thornton, Washington.
E. P. Linde, Ophir.
J. Malmberg, Auburn.
Geo. D. Wyman, Applegate.
W. O. Frost, Placerville.
F. B. Lloyd, Placerville.
R. S. Raw, Omo Ranch
James Mussel, O'Neals.
James E. Keeten, Weimer.
Harrison Hotel, Gold Run.
Springer Smith, Gold Run.
John S. Ferrier, Todds Valley.
Golden Gate Hotel, Graniteville.
Globe Hotel, Jackson.
Peter Zaro, Jackson.
Geo. W. Bothwell, Hedges.
Geo. Zabel, Hart.
Frank Powell, North San Juan.
Wiley J. Tinnin, Room 14, Fiske Bldg., Fresno.
Santa Clara Co. Miners' Ass'n, New Almaden.
Geo. L. Bonney, Maybert.
While Beardsley, Latrobe.
F. G. Albus, Butcher Ranch.
J. R. Page, Westville.
Lafruth & Myers, Michigan Bluff.
J. W. Dunlap, Michigan Bluff.
W. E. Babcock, Forest Hill.
F. H. Harvey, Galt.
Marcus Maack, Oroville.
A. T. McKenzie, Randsburg.
D. M. Pyle, Randsburg.
C. A. Burcham, Randsburg.
Thos. Kearns, Randsburg.
B. M. Atkinson, Randsburg.
Copley & Cosley, Randsburg.
A. J. Petter, Randsburg.
Summit Consolidated G. M. Co., Nevada City.
Geo. L. Hughes, Nevada City.
A. D. Allen, Nevada City.
C. D. Eastin, Nevada City.
Wm. Griffin, Nevada City.
Frank A. Ellermann, Nevada City.
J. M. Walling, Nevada City.
J. S. Gregory, Nevada City.
M. J. Britland, Nevada City.
S. T. Murchie, Nevada City.
T. T. Kirkham, Nevada City.
Martin Bros. & Muir, Nevada City.
J. E. Poingdester, P. O. box 151, Nevada City.
W. A. Dennis, Nevada City.
O. M. Eastman, Nevada City.
C. J. Naffziger, Nevada City.
W. W. Wagoner, Nevada City.
Jas. B. Tulley, Nevada City.
C. H. Weber, Nevada City.
D. J McFall, Nevada City.
Chas. Kahl, Nevada City.
Wm. McKinlay, Nevada City.
M. B. Dumler, Nevada City.
Jas. Power, Nevada City.
A. Isoard, Nevada City.
Jas. Rosewall, Nevada City.
Henry Lane, Nevada City.
A. D. Foote, Grass Valley.
A. Mazza, Grass Valley.
J. M. Johnson, Grass Valley.
Wm. B. Fisher, Grass Valley.
C. A. Brockington, Grass Valley.
James Oliver, Grass Valley.
C. V. Smith, Grass Valley.
Thos. Buckingham, Grass Valley.
Allison Ranch Mine, Grass Valley.
John Mulray, Grass Valley.
John Glasson, Grass Valley.
F. J. Thomas, Grass Valley.
Chas Uren, Grass Valley.
Brunswick Consolidated G. M. Co., Grass Valley.
Wm. Geisendorfer, Weimar.
J. W. Bell, Weimar.
E. Vore, Weimar
John Rice, Camptonville
L. de Tournill, Darwin.
M. V. Rohrer, Napa
A. C. Light, Taylorville.

COLORADO.

Japan Mines Co., No. 107 Boston Bldg., Denver
The Gold Nugget Monthly, Denver
Franz Cazzu, No. 416 Cheeseman Blk., Denver.
W. E. Johnson, No. 806 Equitable Bldg., Denver.
Dewey Bros., Boston Bldg., Denver.
C. M. Walker, No. 1450 S. 10th St., Denver.
W. C. Howard, Denver.
Denver Wire and Iron Works, Denver.
D. C. Irish, Box No. 984, Cripple Creek.
D. C. Kling, Box No. 474, Cripple Creek.
Robt. Victor, Cripple Creek.
Wider & Brook, Box No. 2181, Cripple Creek.
F. D. French, Box No. 731, Cripple Creek.
Robt. A. Rutledge, Box No. 3022, Cripple Creek.
F. J. Andrews, Box No. 1055, Cripple Creek.
John H. McKenzie, Box No. 436, Cripple Creek.
Robinson Bros., Box No. 194, Cripple Creek.
R. W. Fleming, Box No. 994, Cripple Creek.
Williams, Waterman & Co., Cripple Creek.
El Paso Iron Works, Box No. 1194, Cripple Creek.
C. W. Clawson, Supt. Rebecca Mine, Cripple Creek.
J. P. Reddington, Gold King Mine, Cripple Creek.
A. I. Irwin, Box No. 1446, Cripple Creek.
R. A. Frevarthen, Supt. Midget Mine, Cripple Creek.
Nevins, Leech & Co., Nat. Hotel, Cripple Creek.
O. B. Amsden, Box No. 461, Victor.
C. L. Mitton, Box No. 33, Victor.
Jas. O. Rountree, Box No. 556, Victor.
D. G. Linares, Box No. 586, Victor.
J. M. Vincent, Box No. 144, Victor.
James Doyle, Victor.
Fred Doyle, Victor.
Chas. Gammon, Victor.
M. G. Perrine, Box No. 572, Victor.
Chas. Sharp, Box No. 15, Victor.
Robt. Redding, Victor.
T. J. Montgomery, Colo. Springs.
Thos. Fisher, Rosita.
J. E. Seely, Goldfields.
W. P. Crandall, Macon.
F. W. Walker, Box No. 163, Goldfields.
T. P. Rigney, Colo. Springs.
H. L. Wolfe, Macon.

BRITISH COLUMBIA.

I. Jervis, Merchant's Exchange, Vancouver.
Garder, Harmon & Burwell, Vancouver.
David F. Douglass, Vancouver.
Rankin & Thyme, Vancouver.
John McQuillan, Vancouver.
McKennon, De Beck & Co., Vancouver.
H Bell, Irving & Co., Vancouver.
Messrs. Owen & Tutlow, Vancouver.
Lillooet, Fraser River & Caribas Goldfields, Vancouver.
T. H. Culland, Vancouver.
Leland Hotel, Vancouver.
E. Mahon, Vancouver.
Robt. Robertson, 857 Howard St., Vancouver.
Chas. T. Dunbar, Vancouver.
Macfarlane & Co., P. O. box 655, Vancouver.
Thos. Dunn & Co., Vancouver.
C. S. Douglass & Co., Vancouver.
McLennan, McFeely & Co., Vancouver.
Ceperly, Loewen & Campbell, Vancouver.
M. McGregor, Box 19, Victoria.
Tolmie & Stewart, Victoria.
R. J. Johnson, Garrick' Head, Victoria.
E. A. Morris, Victoria.
Arthur Neavers, 44 Wharf St., Victoria.
Hon. Chas. E. Pooley, M. P. P., Victoria.
Bureau of Mines, Victoria.
Beehive Saloon, 4th & Broad Sts., Victoria.
Windsor Hotel, Government St., Victoria.
Major C. T. Dupont, Victoria.
H. J. Scott, Hamilton Powder Co., Victoria.
R. S. Day, P. O. box 155, Victoria.
Dalby & Claxton, P. O. box 505, Victoria.
Lawrence Goodacre, P. O. box 18, Victoria.
J. Muirhead, P. O. box 228, Victoria.
J. Shotbolt, P. O. box 212, Victoria.
Flint & Prossor, P. O. box 468, Victoria.
Driard Hotel, Victoria.
T. Lubbe, P. O. box 222, Victoria.
A. B. Alexander, P. O. box I, Saudon.
Jno. J. Bowers, North Brookfield Mine, Queens Co., Nova Scotia.
Capt. M. N. Garland, North Bend.
Hector McKinnon, Sandon.

ARIZONA.

Senator Mining Co., Yuma.
Chas. Banker, Globe.
E. Rosser, Globe.
Wm. Mill Williams, Globe.
J. A. Chestnut, Hackberry.
H. H. Dyer, Globe.
John Doan, Fortuna.

IDAHO.

Walter Hovey Hill, Grangeville.
Iron Crown Mining and Smelting Co., Newsome.
W. W. Fisk, De Lamar.
M. O. Rollins, Doniphan.

MONTANA.

Public Library, Helena.

NEVADA.

Wm. Willis, Battle Mountain.
L. J. Hanchett, Silver Peak.
J. March, Prospect.

UTAH.

McCornick & Co., Salt Lake City.

WASHINGTON.

The Josie Gold Mining Co., Spokane.
W. Caswell, Tacoma.

CANADA.

D. P. Shuler, Sudbury, Ont.

MEXICO.

Robt. Schneider, Chihuahua, two copies.
Wm. Stewart, Topolobampo, Sinaloa.
M. G. Garner, Compa Minera Central and Anexas Estado de Zacatecas.

MASSACHUSETTS.

Bickford, Spear & Co., P. O. box 2452, Boston.

MICHIGAN.

Geo. Uertz, Assyria.

NEW YORK.

N. Y. Public Library, 40 Lafayette Place, N. Y.

NORTH CAROLINA.

W. J. McKee, Lytton, Randolph Co.

OHIO.

Geo. D. Saxton, Canton.
Herbert T. Beatty, 255 Erie St., cr. Wm. L. Otis, Cleveland.

PENNSYLVANIA.

D. J Linskill, Plymouth.

INDIANA.

D. J. Bouteagle, Elkhard.

MISSOURI.

J. A. Hanley, Clayton.

FLORIDA.

P. G. Lidner, Tallahassee.

FOREIGN

Geo. Emmens, 10 Basinghall St., London E. C., England.
Dantez Bros., 32 Paternoster Row, London E. C., England.
J. Addison Smith, 11 Pall Mall, London S. W., England.
Z. P. Maruya Co., Tokio, Japan.
I. D. Krasnosselski, St. Petersburg, Russia
Mt. Morgan G. M. Co., Mt. Morgan via Rockhampton, Queensland, Australia.

It will be noted that the above list contains 213 new subscriptions received at this office during the three weeks from Dec. 5 '96 to Dec. 26, '96, inclusive. It is cited as being a part of the reports of this office handed to the writer for inspection during the current week. It is to be understood that the above are *new* subscribers during twenty-one days, the usual weekly lists of renewals not being included. These 213 new subscriptions constitute only a very small segment of a very large circle, but show the vigor and vitality of the paper.

This fact illustrates the growth of the number of this paper's readers perhaps better than any other statement could. It also makes evident the fact that the MINING AND SCIENTIFIC PRESS is not purely a local publication; it covers its chosen field in this west half of America. It further shows that, by this paper, the attention of miners everywhere is directed to San Francisco as the great mining center, and is thus believed to be of direct benefit to this city; and, finally, is suggestive of the great increase in the mining activity in this country. Of course, were there no such interest in mining, there would be no such demand for this journal, for no amount of effort could so greatly increase the number of readers unless the industry that it represented was a lively one.

The force of all this is manifest to the advertiser. While no special effort is made to induce merchants and manufacturers to make business announcements herein, yet as a rule live business men realize that a paper read by so many thousand probable customers everywhere is necessarily the best medium in which to advertise what they have to sell. An advertisement, after all, is only a bid for prominence, and those who get the most prominence get the most for their money. A good deal of good money is fooled away in advertising in journals that have no circulation and are therefore of no value.

The thousands of names on the subscription lists of this paper and the weekly sales of the news agents throughout the country furnish no fair idea of the number of our readers. Frequently one copy of the paper is passed around through six or eight different hands, and then mailed elsewhere. A case in point came last October from a little mining town in Arizona. A mine superintendent wrote ordering his paper changed to a post-office address in Mexico, where he would be for the next year. In three weeks after the change was made five new subscribers had sent in a year's subscription from that camp. Evidently five men in that one place had each individually decided to take the paper himself after this. It may also be stated that, in accordance with its usual experience, during the twenty-one days in which, as shown above, 213 new subscriptions were received, there were but 17 discontinuances—from the usual variety of natural causes. This paper holds its subscribers, old and new, and the discontinuance of a subscription, except from the ordinary fluctuations of life, is so rare an occurrence as to be remarkable.

To speak of these business matters at such length may appear to be in bad taste, but a fact that has been so often kindly and widely commented upon by so many of our contemporaries, and a condition of affairs so manifestly satisfactory to thousands of readers and well-wishers all over the country, is deemed worthy of such public and extended notice as it herein receives.

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HAS THE LARGEST CIRCULATION OF ANY PAPER OF THE KIND IN THE COUNTRY? : : :

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THAT GIVES THE EXACT FIGURES OF ITS CIRCULATION?

It is Weekly Read by More Than 20,000 Men in Every Department of Mining and Mechanical Industry.

IF you want your business advertisement seen by the *MEN TO WHOM YOU NATURALLY LOOK FOR BUSINESS* put it in the

MINING AND SCIENTIFIC PRESS.

ESTABLISHED MAY, 1860.

A paper that has led in its line for thirty-six years must have the qualifications that entitle it to the patronage of intelligent men who realize that, while advertising pays, money is thrown away that is given for advertising in papers with no circulation and which give no results.

It is not what advertising costs, but what it produces, that determines its value.

The MINING AND SCIENTIFIC PRESS produces satisfactory results to those who use it. : : : : : :

Economy is the judicious expenditure of money. It is sometimes economy to save ten cents; it is sometimes economy to spend a thousand dollars. Economy in advertising means to put your advertisement where it will do you good.

Success or failure depends upon profitable advertising. Our patrons find an investment in our columns a profitable one.

J. F. Halloran.

The Mineral Output for 1896.

The following letter from John J. Valentine, President of Wells, Fargo & Co., gives their estimates for 1896 of the yield of precious metals:

The following is our annual report of precious metals produced in the States and Territories west of the Missouri river (including British Columbia) during 1896, which shows in the aggregate: Gold, $54,399,242; silver, $35,784,963; copper, $28,869,305; lead, $7,236,026. Total gross result, $126,289,536. The "commercial" value at which the several metals named herein have been estimated is: Silver, 67 cts. per oz.; copper, 11 cts. per lb.; and lead, $3 per cwt.

Allowance must always be made for probable variations from reported figures, by reason of constantly increasing facilities for transporting bullion, ores and base metals from the mines outside of the express and the difficulty of getting entirely reliable data from private sources. Estimates obtained in this way are liable to be exaggerated and are, to a considerable degree, guesswork; but with some modification on this account, made herein, the general results reached, while only approximately correct, may be accepted as the closest approximation possible under the circumstances.

States and Territories.	Gold Dust and Bullion by Express.	Gold Dust and Bullion by Other Conveyances.	Silver Bullion by Express.	Ores and Base Bullion by Freight.	Total.
California	$11,553,928	$7,973,376	$ 83,839	$ 20,248	$15,631,391
Nevada	1,081,656	950,000	478,814	248,894	2,759,364
Oregon	1,746,752	203,452	96,784	25,000	2,071,988
Washington	345,850	37,500	170,500		553,850
Alaska		2,715,955		35,000	2,750,955
Idaho	2,652,500		3,272,682	2,200,000	8,125,182
Montana	4,625,000		9,350,000	23,295,500	37,270,500
Utah	777,698	1,163,122	1,050,348	7,392,591	10,383,759
Colorado	12,712,483		12,185,881	1,956,480	26,854,844
New Mexico	245,115	544,200	179,876	177,600	1,146,791
Arizona	1,313,510	1,775,880	293,618	5,882,909	9,265,917
Dakota	4,572,265		185,000	37,500	4,794,765
Texas			311,730		311,730
Wyoming	25,000		3,500		28,500
British Columbia (entire province)	1,384,000		2,100,000	856,000	4,340,000
Total	$43,035,757	$11,363,485	$29,762,574	$42,127,722	$126,289,536

The gross yield for 1896, shown above, segregated, is approximately as follows:

Gold	43.07	$ 54,399,242
Silver	28.34	35,784,963
Copper	22.86	28,869,305
Lead	5.73	7,236,026
Total		$126,289,536

ANNUAL PRODUCTS OF LEAD, COPPER, SILVER AND GOLD IN THE STATES AND TERRITORIES WEST OF THE MISSOURI RIVER, 1870-1896.

Year.	Production as per W. F. & Co.'s statements, including amounts from British Columbia and West Coast of Mexico.	Product after deducting amounts from British Columbia and *West Coast of Mexico.*	The Net Products of the States and Territories west of the Missouri river, exclusive of British Columbia and West Coast of Mexico, divided, are as follows:			
			Lead.	Copper.	Silver.	Gold.
1870	$ 54,000,000	$ 52,150,000	$ 1,080,000		$17,320,000	$33,750,000
1871	58,284,000	55,784,000	2,100,000		19,286,000	34,398,000
1872	62,236,959	60,351,824	2,250,000		19,924,429	38,177,395
1873	72,258,693	70,139,860	3,450,000		27,483,302	39,206,558
1874	74,401,045	71,965,610	3,800,000		29,699,122	38,466,488
1875	80,889,057	76,703,433	5,100,000		31,635,239	39,968,194
1876	90,875,173	87,219,859	5,040,000		39,292,924	42,886,935
1877	98,421,754	95,811,582	5,085,250		45,846,109	44,880,223
1878	81,154,622	78,276,167	3,452,000		37,248,137	37,576,030
1879	75,349,501	72,688,888	4,185,769		37,032,857	31,470,262
1880	80,167,936	77,232,512	5,742,390	$ 898,000	38,033,055	32,559,067
1881	84,504,417	81,198,474	6,361,902	1,195,000	42,987,613	30,653,959
1882	92,411,835	89,207,549	8,008,155	4 055,037	48,133,039	29,011,318
1883	90,313,612	84,639,212	8,163,550	5,683,921	42,975,101	27,816,640
1884	84,075,954	81,633,835	6,834,091	6,086,252	43,529,925	25,183,567
1885	90,181,260	87,311,382	8,562,991	7,838,036	44,516,599	26,393,756
1886	103,011,761	100,160,222	9,185,192	9,276,755	52,136,851	29,561,424
1887	104,645,959	103,327,770	9,631,073	10,362,746	50,833,884	32,500,067
1888	114,341,592	112,665,569	11,263,630	18,261,490	53,152,747	29,987,702
1889	127,677,836	126,723,384	14,593,323	14,792,763	64,808,637	32,527,661
1890	127,168,410	126,894,855	11,509,571	20,569,092	62,930,831	31,725,361
1891	118,237,441	117,946,565	12,385,780	13,261,663	60,614,004	31,685,118
1892	111,531,700	111,259,508	11,433,947	19,370,516	50,607,601	29,847,444
1893	104,081,591	103,827,623	7,756,040	23,631,339	38,491,521	33,948,723
1894	105,113,489	104,844,112	8,223,513	22,276,294	28,721,014	45,623,291
1895	118,164,642	117,896,988	7,170,367	27,052,115	35,274,777	48,399,729
1896	126,289,536	121,949,536	6,536,026	28,713,305	33,684,963	53,015,242

The exports of silver during the past year to Japan, China, the Straits, etc., have been as follows: From London, $33,968,620; from San Francisco, $9,947,776. Total, $43,916,396, as against $43,956,787 last year. Pounds sterling estimated at $4.84.

United States of Mexico.

STATEMENT OF THE PRODUCT OF GOLD AND SILVER IN THE REPUBLIC OF MEXICO, REVISED AND CORRECTED FROM 1877 TO 1896. VALUES UPON MINTAGE BASIS.

Years.	Gold.	Silver.	Total.
1877-1878	$ 747,000	$24,837,000	$25,584,000
1878-1879	881,000	25,125,000	26,006,000
1879-1880	942,000	26,800,000	27,742,000
1880-1881	1,013,000	29,234,000	30,247,000
1881-1882	937,000	29,329,000	30,266,000
1882-1883	956,000	29,569,000	30,525,000
1883-1884	1,055,000	31,695,000	32,750,000
1884-1885	914,000	33,226,000	34,140,000
1885-1886	1,026,000	34,112,000	35,138,000
1886-1887	1,047,000	34,600,000	35,647,000
1887-1888	1,031,000	34,912,000	35,943,000
1888-1889	1,040,000	40,706,000	41,746,000
1889-1890	1,100,000	41,500,000	42,600,000
1890-1891	1,150,000	43,000,000	44,150,000
1891-1892	1,275,000	45,750,000	47,025,000
1892-1893	1,400,000	48,500,000	49,900,000
1893-1894	1,425,000	47,250,000	48,675,000
1894-1895	4,750,000	54,225,000	58,975,000
1895-1896	5,475,000	54,450,000	59,925,000
Total	$28,164,000	$708,820,000	$736,984,000

EXHIBIT OF THE COINAGE OF MEXICO FROM THE ESTABLISHMENT OF THE MINTS IN 1537 TO THE END OF THE FISCAL YEAR OF 1896.

Colonial Epoch.	Gold.	Silver.	Copper.	Total.
Unmilled coin from 1537 to 1731	$ 8,497,950	$ 752,067,456	$200,000	$ 760,765,406
Pillar coin 1732 to 1771	19,889,014	441,629,211		461,518,225
Bust coin 1772 to 1821	40,391,447	888,563,989	342,893	929,298,329
Independence.	$68,778,411	$2,082,260,656	$542,893	$2,151,581,960
Iturbide's Imperial Bust, from 1822 to 1823	$ 557,392	$ 18,575,569		$ 19,132,961
Republic Eagle, 1824 to June 30, 1873	45,040,628	740,246,485	$5,235,177	790,522,290
Republic.	$45,598,020	$758,822,054	$5,235,177	$809,655,251
Eagle coin, from July 1, 1873, to June 30, 1896	$11,561,080	$557,581,690	$203,296	$569,346,066

SUMMARY.

Colonial Epoch—from 1537 to 1821	$2,151,581,960
Independence—from 1822 to 1873	809,655,251
Republic—from 1875 to 1896	569,346,066
Total	$3,530,583,277

San Francisco, Dec. 31, '96. JOHN J. VALENTINE, President.

Mining Summary.

CALIFORNIA.

Amador.

Republican: At the Anita in drifting north from the shaft at the depth of 500 feet a well defined ledge has been struck. There is a rich streak about 18 inches wide, the whole ledge being about 8 feet thick. All of it will pay to mill.

At Pine Grove the Dane mill has been started on good rock.

At the Lombard the company is preparing to put up a 40-stamp mill.

Record: A body of rich milling ore has been encountered in the 900 and 1250 levels at the South Eureka mine and the mill has resumed operations.

On the 700-level at the Central Eureka mine a drift has been run south 200 feet on the vein and it is still going ahead.

Dispatch: A good body of ore has been struck in the Amador Queen No. 2, 1280 feet from the mouth of the tunnel. Mr. Gould has twenty men employed in the mine and will start up the mill in about ten days. It is intended to sink a shaft on the Badaracco ranch 2000 feet deep, and Mr. Gould goes to London soon to complete the preliminary arrangements.

Charles Mitterbauer recently made a strike in the Wild Bill mine, near West Point, which shows a ledge of rock that will average $35 per ton.

The shaft at the Bellwether mine is now down 300 feet and a drift has been started eastward. They have struck a good body of ore in the drift, which assays well.

The work of repairing the shaft at the Zeila is progressing favorably, but it will be a couple of months yet before the work of taking out ore will be resumed. The mill is still on rock from the Argonaut mine.

Ledger: The Kennedy mine has produced during the last ten years $3,580,000, of which $2,000,000 has been dividends. The output for the year just closed was $371,000. This is a low yield for this mine, owing to the low grade of ore, but it is now working in better rock. The ore body has grown wider from the 800-foot level and reached 30 feet at the 2100 level. The vein seems to be wedge-shaped, with the edge upward. Orders have been given to sink another 200 feet. This mine is now the second deepest gold mine in the world. The shaft from top to bottom, allowing for the incline, measures 2450 feet.

Haskins and Chase, who are working the Burse mine in Pioneer creek, have bought the Baker mine, near West Point, and are sinking a shaft and driving a tunnel. They have placed a contract for a 10-stamp mill.

Cuneo & Harmon, who own the Missouri mine, have four men at work taking out ore preparatory to making a test crushing.

A rich shoot of ore has been struck in the Union Consolidated.

Butte.

Register: At Enterprise Fred Bachman is down 260 feet on the ledge and the rock shows three feet of excellent ore. He runs four stamps by water power and gets good returns.

At the Golden Fissure, or Shaw & Watson mine, they have a 5-stamp mill run by water. Their ledge is about 3 feet wide and prospects well. They are down 100 feet on the ledge, and will start a lower tunnel shortly.

At the Crystal Peak mine, owned by Alm Bros., they have three ledges. One is undeveloped, on the second they have run a tunnel 180 feet and struck the ledge fully 100 feet down. The vein is from 4 to 6 feet wide.

From thirty-five to forty men were at work in the Magalia, from twelve to fifteen men at the Princess and sixteen men at the Peter Woods mine, of which E. C. Paxton is superintendent.

Mercury: The Burlington Consolidated Mining Company of San Francisco, which own three claims west of Forbestown, are pushing development work. They have made several short crosscuts from the old tunnel ahead on the ledge. The ledge is about 7 feet wide and is of very good-looking rock, heavy with sulphurets.

On the Costize mine, on McCall creek, they have a ledge which ranges in width from 18 inches to 12 feet and can be traced the full 1500 feet of the claim. They have started a tunnel which will tap the ledge 250 feet below the cropping.

At the Missouri mine, Wilkie and Fennimore have encountered some stringers of quartz and believe they will strike the ledge within a few feet.

Democrat: At Enterprise, on the Oregon quartz mine, owned by Josiah Champion, he has men at work in a tunnel which now is in over 400 feet. The lode promises well and he will erect a mill as soon as the tunnel is finished.

J. O. Carlisle has a quartz claim near Enterprise with a 5-stamp mill crushing the rock.

Shaw, Mearch & Watson have a well-defined lode claim and are working the rock in a 4-stamp mill.

The Alm brothers have a 2-stamp mill working quartz from a claim near the middle fork of Feather river, and they say the working tests are such as to warrant erecting a larger mill.

Calaveras.

The Boston mine people are enlarging the shaft to three compartments. They have about 100 feet to go to reach the bottom.

El Dorado.

(Special Correspondence).—The shaft on the Blanchard mine has reached 157 feet. The company is sinking a winze from the 57-foot level. The new 5-stamp mill is running steadily on good ore.

Gravel properties about Newtown, ten miles south of here, are receiving merited attention. The Rio di Oro hydraulic plant is running day and night. This property comprises over 600 acres.

Activity on the Pine Hill Gold Mining Company's properties, nine miles west, continues. The main shaft is 200 feet, with a 217-foot drift from this level. On the 150-foot level a drift runs south 280 feet, and another to the west 284 feet. The company owns 206 acres. They have crosscut, to date, three large ledges of good grade ore.

The transfer of the Griffith Consolidated, four miles southwest of Placerville, from C. F. Bryant to E. A. Stent is of record. The sale of this property by Mr. Stent to J. D. Gow has been noted by the San Francisco dailies.

The Big Sandy at Kelsey has reached 240 feet in the shaft. Considerable drifting has been done north and south and crosscut several ledges, but the foot wall has not yet been reached. Mill tests of the ore have yielded $35 per ton in free gold. There is a system of ledges and they widen as depth is attained.

The Amazon, two miles north of Kelsey, is drifting on the 200-foot level. W. R. Chadbourne of Leadville is operating the property and working three shifts.

Alderson & Brown began development work this week on a property of magnitude four miles southwest of town. They have grouped into one property the patented claims known as the Essex, Edna, Cincinnati, Rattler, Champion, Keystone and Concordia, now known in the United States patent as the Eden Consolidated. The reopening of these properties, with the determination of going to great depth, will aid partially to demonstrate to a certainty the golden future of El Dorado county.

Placerville, Jan. 19, '97.

Kern.

Californian: W. C. Campbell, a placer miner, has become interested in several claims near Kernville and has invested $40,000 and is now buying up adjacent claims and is having considerable freight shipped in.

Several parties of prospectors are settled at Piute and are systematically at work.

W. C. Wilson of Mojave has sold out his mine in the Slate Range district for $16,000 cash.

The Good Hope is now bonded for $125,000 by the Kenyons to Smith and Centre of Pasadena. The bond runs until February 1.

J. J. Brown of Leadville and James A. Shinn, his expert, have been investigating Randsburg. Mr. Brown has put in between $20,000 and $30,000 and has bought nine claims.

Nevada.

Transcript: Rich gravel has been struck in the Odin drift gravel mine. Work at this mine was resumed only a short time ago, under new management, and the strike was made in a new drift that is being run for the channel.

Union: The owners of the Bellfontaine in Willow valley are desirous of developing the property and erecting a mill, and have decided to sell 25,000 of the 100,000 shares for a working capital.

Cline, Burton and Sleeper have a bond on the Lord mine, adjoining the Red Hill, west of Grass Valley.

Herald: The Gold Point mine, Grass Valley, is turning out $15 ore.

Transcript: In the Washington district Hayes Bros. are finding big nuggets and coarse gold in their gravel mine.

The Washington mine has been examined by experts, with a view to purchasing and reopening the property.

At the California mine Supt. Harmon is pushing the tunnel ahead rapidly, and expects soon to cut into the ore shoots that paid so well in the upper workings.

Work is soon to begin on the Giant King mine and on Worthley & Co.'s claim.

Telegraph: On the Omaha group of mines work is being actively prosecuted southward in the development of the Homeward Bound property, lately purchased. No. 8 drift encountered the shoot of ore a few days ago, the vein averaging from 1 to 3 feet in thickness, and stoping and underhand work are also being actively prosecuted. The Omaha has a 28-stamp mill, which is going to its full capacity. There are now employed sixty men, besides about thirty tributers.

At the Bullion mine, which is opened by a three-compartment shaft, one pumping and two hoisting compartments, work is progressing steadily. The shaft, which is now down 760 feet, is being run to cut the 800-foot level, from where it is the present intention to turn a drift south to cut the old "Ione" shoot of ore. There are at present about twenty-five men employed. It is the intention of the company to put up a 20-stamp mill in the near future.

Placer.

The Grand Victory Mining Company has been incorporated with a capital of $120,000 to work property located on Fall creek, about nine miles from Emigrant Gap. The mine is a gravel one, and will be worked by the drifting process. They have a shaft about 80 feet in depth. Further progress was stopped by encountering a large quantity of water.

Sentinel: A prospect stamp mill has been erected at the Blackhawk gravel mine, near Forest Hill.

The mill at the Redstone quartz mine, near Blue Canyon, has been started up. The company is working quice a force of men.

San Bernardino.

Independent: The report that work at the old Gold Mountain mine, at Bear valley, had been entirely suspended, was erroneous. Work will continue along the line laid down by Superintendent Church for those who have bonded the property from E. J. Baldwin.

Siskiyou.

News: Dannenbrink Brothers, on Know Nothing creek, are working on the 1300-foot

level, where the vein is 4 feet wide, the ore averaging about $50 per ton.

The Salmon River Hydraulic and Ditch Company keeps three giants running and is opening up some rich gravel in the old channel.

Deistlehorst & Barton dredger, at Oak bar, is taking out good pay $40 to $60 each shift. The company intend to build another dredger on the river above the Freshour ferry.

Neil & Wentzel are taking out good ore in the upper level of the Nebraska mine, on Cherry creek.

G. H. Goss has another pay chute in the Drummer Boy, on Cherry creek.

Mann & Bogard have found good pay in Poverty Point, near Oak Bar, a claim they leased from H. J. Barton.

Trinity.

Journal: At Coleridge there are twenty stamps running on the creek—five at the Yellowstone, five at the Enterprise and ten at the Star.

At the Star mine they are running the south drift ahead on the ledge, which is now 6 feet wide in the face of the drift and looks well. The mill is running day shift on good ore.

The winze in the Lone Jack mine has opened up a large body of good ore.

Tuolumne.

Union-Democrat: The Mammoth mill is being prepared for treating the high-grade ore. The stamps are in and the concentrators will be ready by the first of February.

The Gerrymander mine is being worked by its new owners, with J. L. Joseph as superintendent. A 5-stamp mill is on the property, and this will be overhauled and in working order inside of a month.

At the Confidence ore is being extracted from the 800 level and crushed by the 30-stamp mill. Good milling ore is found on the various levels.

At the Star a chlorination plant of three tons capacity has been put in.

Citizens of Jamestown have organized a company to work the old New York drift gravel mine on Table mountain, which yie ded half a million dollars in 1854-56. Litigation stopped operations and the claim has lain idle ever since. At present nine men are employed.

Chronicle: At the Belleview mine, taken hold of under bond by the California Exploration Company, the 5-stamp mill has been closed down and two shafts will be sunk to a depth of 760 feet. If the ore body shows up as expected, it is the intention to erect a 60 stamp mill.

Independent: The Santa Ysabel Mining Company is erecting a 20-stamp mill, the grading for which is almost completed. Sinking still goes on in the three shafts and crosscutting. Shafts No. 1 and No. 2 have recently been connected and connection with No. 3 will shortly be made.

Work on the Last Chance placer mine at Montezuma has been resumed.

The Golden Gate mine is running full force night and day and the quality of the sulphurets is richer than ever.

The Jumper mine will shortly use electricity for power.

The Golden Rule mine is sinking and crosscutting and the quality of the ore proving very satisfactory.

The Isabella & Gem mine, owned by J. Faxon, is liable to be opened up again shortly.

Yuba.

At New York Flat, in Yuba county, south of Forbestown, T. H. Steel is working his claim by hydraulic process under a permit from the Debris Commission. He has seven men employed. He is working in low ground and uses a hydraulic elevator, which, with a 4½-inch nozzle, 16-inch truck and 325-foot pressure, raises the water and gravel to a flume 23 feet above bedrock.

Near New York Flat, A. F. Roberts is working an extension of the old Deadwood ledge. He has a tunnel in over 500 feet.

NEVADA.

White Pine *News*: In the Granite district, east of Egan range, the Ben Hur, a new discovery, was recently sold by W. D. Campbell to Salt Lake people, who will operate it with a large force of men. This sale has attracted the attention of prospectors, and they have located a number of claims, which show large ledges carrying gold and silver.

De Lamar *Lode*: At State Line a new strike of very rich gold ore has been made by Hicks Brothers and Mesher on the Nevada side of the line.

F. N. Millett has incorporated the Gold Hill Milling and Mining Campany, Provo capitalists furnishing the money to drive a 400-foot tunnel on the property.

Mr. Christie is soon to close a deal with the Eagle Valley district claim owners.

The strike at the Magnolia has drawn attention to that locality. In the main body is a seam of ore which at times shows free gold. Much of it shows valuation of over $200 in gold and as much as 60 ounces in silver.

The Austin Mining Company's new mill will be in operation in ninety days.

The Keystone mill has been started up.

Elko *Free Press*: Bald Mountain, Ruby Mountain district, White Pine county, has taken on a lively appearance within the past six weeks, consequent upon the arrival of a number of Elko and Eastern mining men. Denver and New York capitalists are getting hold of a large amount of mining property with W. B. Duvall as their superintendent.

In the Salmon River district, in the northeastern part of Elko county, about 100 men are mining. Last summer some Montana men began the erection of a 30-ton smelter, which was started up last week. Coke will come from San Francisco. The ores of the district run high in copper with some silver and gold. Among the mines working are the Brooklyn, owned by English & Co. This company has about 250 tons of ore now ready for the smelter and teams are hauling it for reduction.

A number of promising mines have been opened within five or six miles of the smelter. Good ore, containing copper and silver, is being taken out.

OREGON.

BAKER COUNTY.

The Alturas Mining Company is spending $1000 a month in development.

The Virtue mine has a new hoist, with capacity to sink to a depth of 2000 feet, the first step toward really deep mining in Oregon.

The North Pole mine and mill are in full activity. As soon as the raise to the surface is completed there will be room for 100 miners to work. It is proposed to enlarge the mill.

Grants Pass *Observer*: J. E. Brown has a 30-foot tunnel on Mt. Reuben, adjoining the Ajax, which shows a ledge of 7 to 8 feet of solid ore.

C. A. Wilcox of Wimer, on Evans creek, will put a pipe and giant on his placer this season.

George Darwin, superintendent of the Jewett mine, has put a force of men at work driving a lower crosscut tunnel to cut the lead at a depth of 160 feet below the present workings.

Nearly all the bars along Rogue river between Woodville and the mouth of Galice creek have been located and many pumping plants will be worked next season.

Medford *Monitor-Miner*: The Bonanza mine recently turned out in twenty-six days' run $20,000 in gold.

The newly discovered mine, the Jumbo, owned by James & Myers, on Catherine creek, east of Union, was bonded recently for $65,000 to St. Louis capitalists.

The Black Channel gold mine, on Foots creek, is being worked by about sixty men, under the management of Superintendent Shotwell.

A deal has been closed by some Eastern parties for the ranches belonging to McDougal, Mardon, Hall and Mrs. Birdsey, on Kane's creek, near Gold Hill. The purpose is to use the land for gravel mining. The consideration is about $30,000. It is the intention to run a large ditch from upper Bear creek.

WASHINGTON.

Spokesman-Review: The Bridgeport Mining and Development Company at Conconully have a group of fourteen claims on which a development tunnel has been started and will be continued until it is in 1500 feet, at which point a vertical depth of 800 feet will be attained. In the process of this work at least a dozen veins which appear on the surface will be cut.

Within a few miles of Loomiston, Okanogan county, prospectors have discovered a 14-foot ledge of rich ore, traceable on the surface for 4500 feet. Crosscuts were made at a depth of 40 feet, assays running from $11 to $35 a ton. Samples of the ore are not distinguishable from the ore of the Le Roi mine, and it was the similarity of the iron capping to that found in the Trail district that led to the discovery of the mines.

Spokane *Chronicle*: The owners of the Old Dominion, at Colville, have spent about $600,000 in developing it until now there is over 15,000 feet of work completed. The main tunnel is in 3000 feet, which gives a vertical depth of 800 feet and on the dip of the vein 1200 feet. During the last three years they have purchased fifty-two additional properties. As soon as the new machinery arrives, seventy-five men will be put to work and the tunnel will be pushed on 3000 feet more.

BRITISH COLUMBIA.

Spokesman-Review: Preparations are being made to start the Volcanic property, near Grand Forks, on or about March 1st. Enough capital has already been guaranteed to fully equip the mine for extensive development. This and other work contemplated will mean the building of a large smelter near Volcanic mountain and the encouragement of a railroad into Grand Forks before the 1st of next September.

The Seattle Company will also start work on its property about that time. A shaft is to be sunk 200 feet.

There are twelve mines up the North Fork and around Grand Forks being worked at present with good results, and most of the money furnished comes from Spokane.

The Pathfinder property, now under bond to Rossland and Toronto parties, has been announced to start work soon after March 1st.

The following is the output of the Slocan district for the first week of 1897:

Mine.	*Tons.*
Payne, Slocan	306
Slocan Star, Sandon	200
Surprise, Slocan	17
Idaho, Slocan	80
Enterprise, Slocan	40
Jackson, Slocan	61
Ruth	15
Rambler, Slocan	16
Wonderful	30
Blue Bird, Slocan	12
Antoine, Slocan	17
Whitewater, Slocan	90
Last Chance, Slocan	51
Washington	32
Reco, Slocan	88
Consolation, Slocan	12
Total for week	1,179
Approximate value	$140,670

At Rossland a syndicate from Toronto has closed a deal for the Silent Friend, a claim adjoining the Commander, and work will commence in a few days under the new company.

One of the most important strikes of ore ever made in a Trail Creek mine has been uncovered in the O. K. It was in the stopes upward from the eleventh tunnel, and was a streak of perfectly free-milling ore.

A three-fifths interest in the Edith, Arm and Hammer, Hidden Treasure and City of Spokane mineral claims, near Nelson, Galleger, Blaine and Stoll, has been bonded to English parties for $10,000. The first payment has been made.

UTAH.

Salt Lake *Tribune*: At Mercur the management of La Cigale will not undertake the erection of a mill on that ground until more ore has been blocked out.

The management of the Rover has been directed to proceed with the development of the property.

The property of the Rover has already been quite extensively explored, the workings at present covering 1600 feet.

At Lion Hill the mill at the Northern Light is nearing completion and will start up on sixty tons a day. Forty-five men are now constructing the pipe line, which will cover a distance of 15,000 feet. With reference to developments on the mine, Superintendent Hines reports the vein now opened up for 2½ miles, beginning at the Monarch No. 3 and connecting with what is known as the Winter Quarters claim. Concerning the ores, he says the whole will average about $19 in gold and $12.62 in silver.

On the McKinley mine they are drifting on the vein and have already uncovered ore running from 10 to 6600 ounces in silver.

At Park City the winze being sunk from the 1500-foot level in Ontario shaft No. 2 is down 130 feet, all in good ore. Twenty-five cars of ore are being taken out every twenty-four hours, and, as soon as stoping will be begun on the 1700-foot level, the output can be made to exceed 100 cars.

At Fish Springs the Utah and Galena mines make regular shipments and are steadily improving with development.

The Emma property, now under bond and lease to the Bradshaw brothers of Lehi, has improved greatly in the last two months.

At Bingham the owners of the Highland Boy will in a few days let a contract for erecting one of the largest mills in Utah. Meanwhile the blocking out of ore is progressing steadily and already there is enough in sight to run the mill for a long period.

The Bingham Copper Company is now below the water level in its search for copper, and important results are expected.

The Yosemite No. 2 has been purchased by the Sampson Mining Company. It is understood that the consideration was a large block—about one-half of the 500,000 shares of the Sampson Company—so that the transaction was in effect a consolidation.

Mammoth *Record*: Water in the Undine has been increasing so rapidly that it was found impossible to run more than one shift a day profitably. A tank has been erected, and teams are now hauling water to the various other properties in the vicinity. A mine of water in this district is somewhat of a bonanza itself.

The Sunbeam shaft is going down at the rate of 3 feet a day. The formation at the bottom of the shaft is changing rapidly, and the indications are that ore is not far away.

Excavations have been completed for a new hoist at the Southern Eureka.

Tintic *Miner*: Work has commenced on the old Park mine, recently purchased by Riter and Loose. A new incline shaft will be sunk on the vein.

Kirby and Cobb, with their Salt Lake associates, have closed a deal for the Pride of the Hills group.

A strike is reported this week in the Ajax on the north drift from the 400-foot level.

Eureka *Democrat*: A steam hoist is to be put in at the Homestake, and will be in operation within thirty days. The shaft is now down 265 feet.

Work has begun on the May Day, and a tunnel is being run to tap the bottom of the shaft, which is down 63 feet, where the indications are such that, with a small amount of drifting, the Humbug vein will be reached.

IDAHO.

Spokesman-Review: The Standard mine, in the Cœur d'Alene district, distributed $400,000 in dividends among its stockholders last year.

Miners from the Pierce district report snow falling. Placer miners are pleased over the prospects. The heaviest snow storms usually prevail in January and February in the mountains.

The tunnel in the Bimetallic group will be driven 200 feet more, which will tap the main ledge.

The progress in the gold fields of Florence during the past year has been devoted principally to preparatory work for the present year. Altogether, there has been about 3500 feet of tunnel driven and nearly 1500 feet of shaft sunk on claims in the various parts of the camp. Ore from many of the claims has been worked in the new custom mill, giving average results of $40 a ton.

A scheme is on foot to tap by a tunnel the ore bodies of the Florence district. Florence is 4110 feet above Salmon river; at the wire bridge the altitude is 2165 feet above sea level. The depth thus obtained by the proposed tunnel exceeds 4000 feet, and in this distance there are ledges carrying gold every 100 feet from Florence to the Salmon river, a distance of eight miles.

From the Pierce district in 1895 about $30,000 worth of gold dust was shipped, while the figures of shipment for 1896 sum up a little over $100,000.

MONTANA.

Butte *Miner*: The Boston and Montana Company's concentrator, at Great Falls, which has been closed down for several months, started up last week and forty new men were put to work. Several matte furnaces have started up, and from this time on the whole plant will be kept in continuous operation.

The Vulcan silver mine will start up about February 1, and nearly 100 men will be given employment. This mine has been closed down since the great decline in the price of silver bullion, and has filled up with water.

In the Colusa Parrot the 1200 level has been reached, and a station is being made. Another 100 feet will be sunk before exploring will commence by cross-cutting. In the meantime ore is being shipped from the upper levels.

Butte *Mining and Railway Review*: A rich body of ore, 3 feet wide, which carries a large percentage of copper, has been discovered in the tunnel in the rear of a livery stable at Wickes.

A 20-stamp mill is to be built at the Mammoth mine, near Shoup, Lemhi county. The property was recently sold by A. Torpence to an Eastern syndicate, and extensive development will be pushed during the winter.

SOUTH DAKOTA.

Black Hills *Times*: The following figures, which have been obtained from officials and annual reports of the companies mentioned, can be verified at any time. They show plainly the rapid increase of production made by the richest 100 miles square on earth, known as the Black Hills district:

Mine.	*Tons Treated.*	*Value.*
Homestake	285,000	$1,572,000
Highland	192,300	737,000
Deadwood-Terra	204,000	400,000
Apex Consol	8,120	24,000
J. R	1,600	15,000
Keystone	18,600	85,000
Holy Terror	10,000	72,000
Deadbroke	7,500	50,000
St. Elmo	1,200	15,000
Grizzly Bear	1,850	12,050
Hawkeye	8,300	22,000
Columbus	1,000	5,000
D. and D. Smelter	132,000	1,960,000
Union Hill Smelter	4,300	55,000
Golden Reward	48,117	998,000
Cyanide Mill	25,033	398,000
Kildonan Mill	33,943	700,000
Ores shipped	43,000	1,075,000
Placer mines, estimated		25,000
Total for 1896	1,013,560	$8,235,000
Total for 1895	833,800	4,910,000
Increase	179,760	$3,325,000

It must also be remembered that these figures do not include the bi-product of silver and copper, neither do they include the product of several small quartz mines in the vicinity of Central City, nor those of Garden City and Carbonate Camp. The *Times* believes that if the actual gold product of the Black Hills for 1896 could be arrived at, the amount would be nearer $12,000,000 than the total expressed in the figures given above.

The Union Hill Company are pushing work in all directions on their large holdings and getting out enough ore from the present openings to supply a plant of 100 tons daily capacity.

A diamond drill capable of sinking 2500 feet will soon be in operation on the Gold Belt and Alaska group of claims in Ragged Top camp, owned by General Green B. Raum and associates.

The Swamp Eagle lode, on the Poorman divide, has resumed work and will open up the large body of free milling cement ore which is known to extend through the claim.

NEW MEXICO.

Santa Fe *New Mexican*: In the Carlisle gold district of Grant county, where for several years the Steeple Rock Mining Company has been successfully operating, the Exploration Company of London, backers of the company, have quietly secured control of 125 promising gold prospects in the district and have about completed arrangements for extensive development. The plans of the Steeple Rock Company contemplate the reduction of 1000 tons of ore per day in the course of a few months. Huntington mills will be operated in connection with the chlorination process.

The site for the smelter of the Mary Mining and Smelting Company at Cerrillos has been practically decided upon. It consists of about fifteen blocks in the original town of Cerrillos, north of the San Marcos arroyo. The property is owned by Senator Elkins of West Virginia.

Silver City *Enterprise*: At Pinos Altos the Treasure Mining Company, of Denver, Colo., is working about fifty men in the Atlantic mine and mill. This company is making preparations to start operations upon the old Deep Down property, which is also owned by the company. This will give employment to twenty or thirty more miners.

At Pinos Altos A. Hersberger is working ten men on the Western mine. He will have a mill-run made at the Stanley-Martin mill next week.

Spiller and McLean are again working the Pacific Gold Company's claim on the Pacific vein. They are running ten stamps of the company's mill, near Silver City, concentrating the ore.

At Gold Hill the Woods mill is running daily on ores from the Woods prospects.

The Western Belle has started up again, and, if satisfactory results are obtained, another mill will be built.

The Standard Company will start up soon.

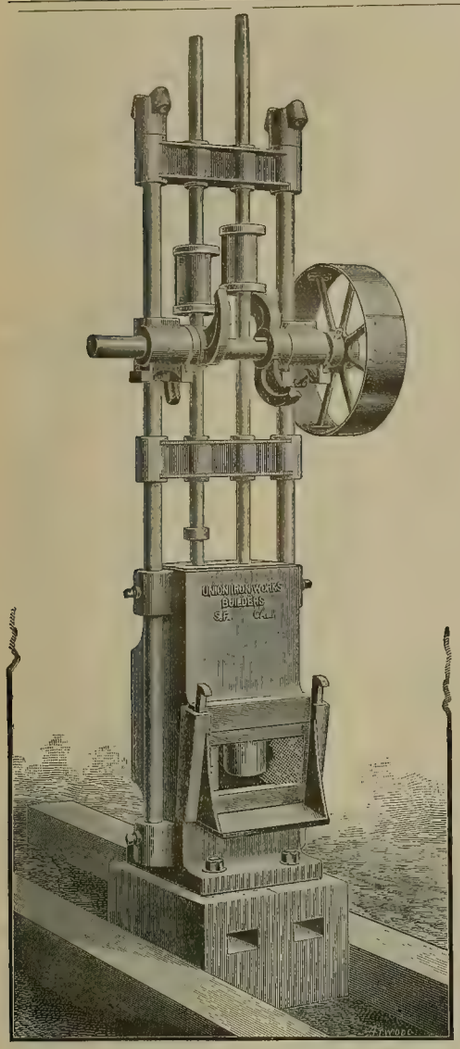
ARIZONA.

Tombstone *Prospect*: The Old Glory mill has closed down. It has ore crushing capacity for only twenty stamps and is adding enough ore crushers to supply the thirty stamps at the mill. The capacity of the reservoir is also to be increased; during the meantime development work continues on the mine.

Phœnix *Republican*: Work on the new smelter belonging to the Empire Smelting Company at Rollin is progressing and it will soon be ready to blow in.

There is a promise of some business for Gila Bend, growing out of the development of mining properties in the neighborhood. Recent new discoveries are looking well, and parties are now on the way to inspect them.

At Goldfield many claims are being developed. About seventy-five men are kept employed constantly at the Mammoth mine, and the 20 stamp mill is kept busy.



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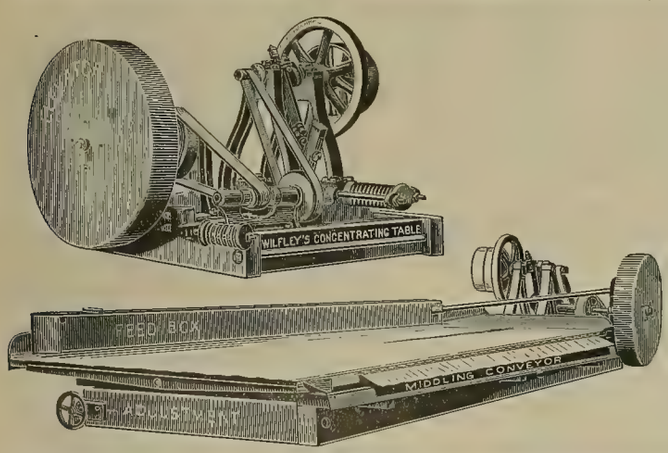
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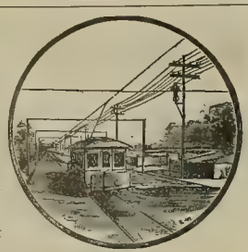
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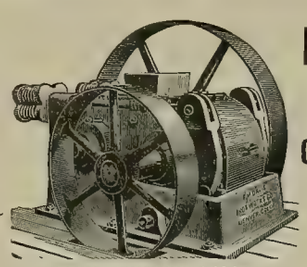
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Sacramento, California

Coast Industrial Notes.

—San Diego, Cal., oranges sell in Boston, Mass., for $2.40 per box.

—It is thought in San Francisco that wheat will go to $2 per cental this year.

—Newburg, Or., proposes to spend $15,000 gold bonds for a gravity system of water works.

—Miller & Lux have bought all the sheep feeding in Big Meadows, Nevada, amounting to about 25,000 head. The prices paid range from $2.25 to $3.75 per head.

—Contracts have been let for construction of Gray's Harbor Government light station, to cost $30,000. The contract for supplying metal for the works was let for $7443.

—The W. J. Cox ranch of twenty acres at Azusa, Los Angeles county, was sold last week for $17,000, or at the rate of $850 an acre. It lies one mile east of Azusa and is planted almost exclusively to navel oranges.

—The Blue Canyon Water Company has been incorporated in Sacramento to furnish water for drinking purposes, bringing it to Sacramento from Blue Canyon Springs, in the Sierra Nevadas, in cars to be constructed for that purpose.

—It is thought that the $1,500,000 bonds recently issued by San Diego, Cal., will be withdrawn for a time at least. They were designed to pay for an extensive water system, but City Engineer Capps has refused to accept the dam.

—The House Committee on Public Buildings and Grounds has ordered favorable report on Senate bills authorizing public buildings at Tacoma, Wash., to cost $400,000, at Salem, Or., to cost $100,000, and at Aberdeen, S. D., to cost $100,000.

—Produce exports from San Francisco by sea in 1896 were $43,556,000, against $33,375,000 in 1895, a gain of $10,000,000 last year. Of the total, New York took $3,008,000, Great Britain $16,121,000, Australia $4,743,400, Hawaiian Islands $3,695,400, China $3,193,800, Japan $2,489,300, Mexico $1,441,000, Central America $3,410,500, and South Africa $1,048,300.

—Gen. Nelson A. Miles, chief of the Ordnance Board, says a dispatch from Washington, D. C., has decided to make a demand for appropriations for defense on four points on the Pacific coast as follows:

Location.	Guns.	Emplacements.	Barracks.
San Francisco.....	$363,000	$294,000	$251,050
San Diego.....	271,400	204,000	125,505
Mouth Columbia.....	236,800	204,000	125,525
Puget Sound.....	207,000	216,000	251,050

—The current freight rate by sailing vessel from New York to San Francisco, round Cape Horn, is about 37½ cents, and 5 per cent per 100 pounds, and this rate is hardly ever subject to a fluctuation of more than 5 cents either way. Rates from the other side rule considerably lower than this, averaging from Liverpool to San Francisco between $5 and $6 per ton of 2240 pounds. The main reason for the cheaper freight rates from England is that the sailing vessels arrive there with cargoes, while they frequently have to come in ballast.

A Handsome Catalogue.



A catalogue is issued by the American Blower Company, Detroit, Mich. The accompanying sketch is a miniature reproduction of the cover. The book, of over 200 pages, is divided into thirteen parts, each devoted to a different subject, and contains new matter of interest to engineers, contractors and architects; new fan and blower capacity tables, etc. Those interested in blowers and mine ventilation should write for the catalogue.

Recent California Mining Incorporations.

Templeton Milling Company, Templeton, Cal.; capital, $15,000; subscribed, $5460.

Sandusky and Oregon Creek Placer Mining Co., San Francisco; capital, $10,000,000; $2500 subscribed.

Selby Mining Co., San Francisco; capital stock, $1,000,000—$500 subscribed; E. J. McCutchen, H. R. Mann, W. H. Martin, W. W. Deamer, V. Neale.

Empress Josephine G. M. & M. Co., San Francisco; capital stock, $500,000—335,000 subscribed: W. O. Frost, R. P. Saxe, L. W. Wilbeck, S. C. Nash, B. G. Smith.

Trinity M. & M. Co., San Francisco; capital stock, $300,000—$500 subscribed; C. H. Fish, H. G. Blasdel, D. E. Hayes, W. S. Chapman, L. L. Bettys.

Webster G. M. Co., San Francisco; W. S. Weymouth, W. C. Lewis, A. T. Dunbar, J. A. Stephens, G. S. George; capital stock $500,000—$250 subscribed.

Recently Declared Mining Dividends.

Mercur, Utah, $25,000, payable Jan. 19th. The total to date is $300,000.

Alice Mining Co., Montana, $25,000, payable Jan. 12th. This is a total to date of $995,000.

Bullion-Beck, Utah, Jan. 20th, 20 cents per share.

Centennial-Eureka, Utah, Jan. 15th, $1 per share.

Galena, Utah, Jan. 11th, 5 cents per share.

Silver King, Utah, Jan. 11th, 25 cents per share.

The Calumet & Hecla Company of Michigan, $1,500,000, payable February 10. This is dividend No. 101, and makes a total of $48,350,000 declared to date.

Personal.

C. L. MORRILL, representing the Johannesburg, Kern Co., Cal., Mining & Milling Co., is in San Francisco to buy a stamp mill for that new camp.

J. J. BROWN and James A. Shinn of Leadville, who have been in the Randsburg district, where they made some investments, are now in San Francisco.

CHARLES BUTTERS has arrived from Salt Lake, where he stayed over on his way from South Africa, to look over the ground with a view to establishing cyanide plants. He will return to South Africa in a few weeks, but expects before many months to come back to California and remain.

AT the forty-fourth annual meeting of the American Society of Civil Engineers in New York City last Wednesday the following officers were elected for the ensuing year: President, B. M. Harrod of New Orleans; vice-presidents, Col. George H. Mendell of San Francisco and John F. Wallace of Chicago: treasurer, John Thomson of New York.

L. P. GOLDSTONE, of Grass Valley, who was formerly connected with the State Mining Bureau, for which he did some valuable work, leaves in a few days for London and will from there go to Coolgardie, Western Australia, to take charge of mines owned by an English syndicate. Mr. Goldstone has for some time been operating mines in Grass Valley.

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In order to meet the great demand for reliable information about mines and mining camps, one of Denver's oldest and best known publishers has just issued a handsomely illustrated book accurately describing every mining camp in the entire State of Colorado, giving scores of truthful photo-engravings of famous mines, mountains, cities, etc. Cripple Creek, the world's wonder, is fully described; also a correct map of the district. Narratives of how many poor people have become wealthy by judicious investments in gold mines, and sketches of former prospectors who are now fixed for life. Tells how to avoid unscrupulous brokers and sharpers. The volume has been carefully compiled by a disinterested author and every statement made is guaranteed to be true. All terms and phrases of miners fully explained; tables showing the State's production of gold and silver for 35 years past. The publisher will send by return mail a copy of the above great book upon receipt of 25c. (currency or stamps), which also includes a 3-months trial subscription to his big 56-column weekly family paper, the *Illustrated Weekly Sentinel* of Denver, Colorado (established 1890). Clubs of 5 and 5 books, $1. The paper contains each week all the latest mining news and illustrations of Rocky mountain scenery, also true stories of love and adventure Cut this out. Address as above and mention The Press when you write. It is reliable.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from S. J. Holsinger, in the Drummondsville mine, near Forest Home, Amador county, to deposit tailings in Drummondsville creek; and from G. D. Duncan & Co., in the Pebble Bottom mine, near Yankee Jim's, Placer county, to deposit tailings in a ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on January 25, 1897, at 1:30 P. M.

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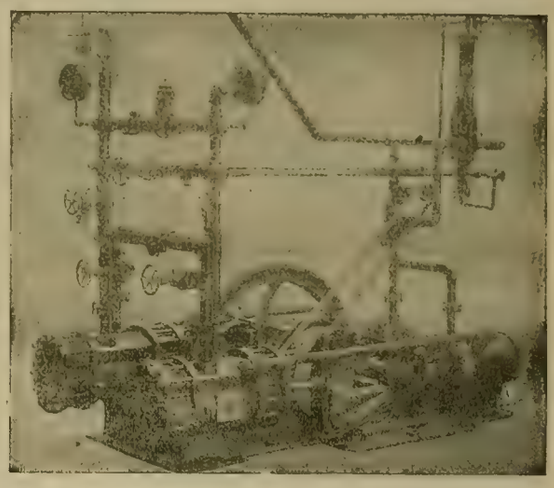
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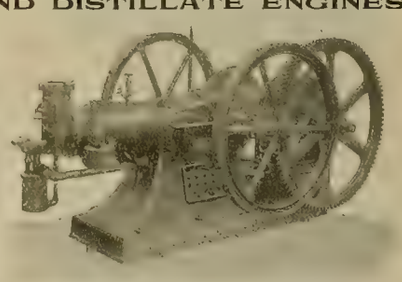
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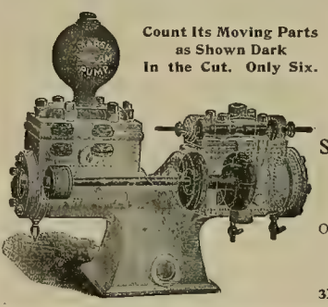
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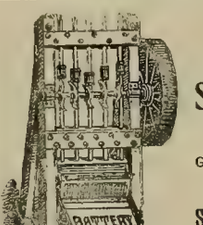
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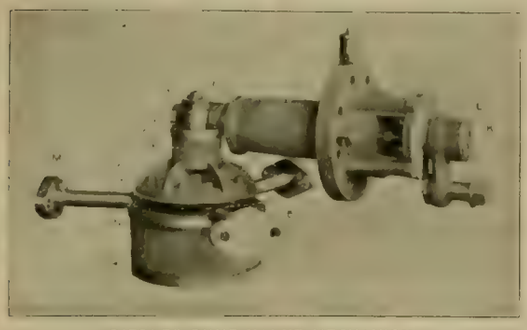
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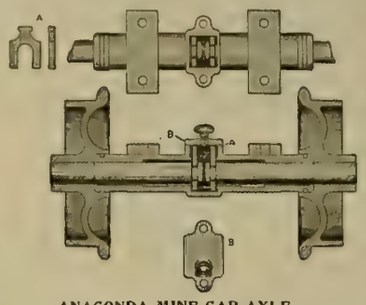
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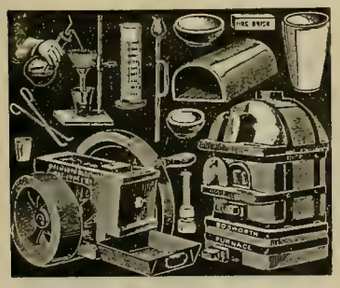
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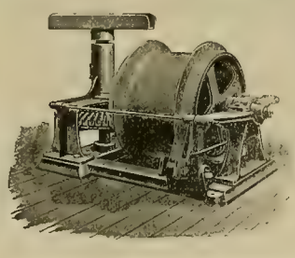
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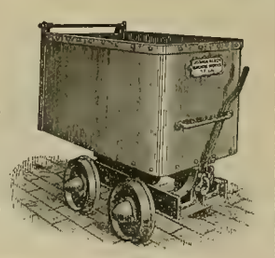
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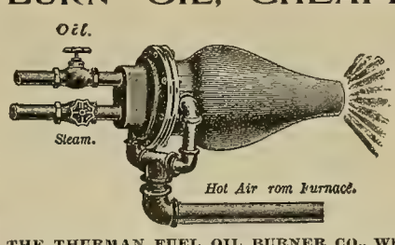
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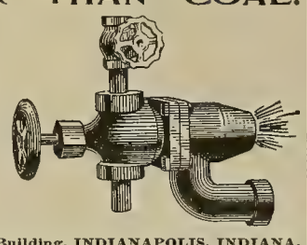
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At a conference between the Senate and Assembly Committees on Mines and Mining and the Committee on Public Works, held at Sacramento last week, there was shown a desire on the part of the representatives both from the farming and the mining districts to do all they could to effect an amicable arrangement by which the different interests may work for the common good. The sentiments expressed went far to show that there has lately grown up a very good feeling between the miners and the farmers.

Senator Doty, speaking for the farmers, said that they should try to get help from the State and get immediate relief, and at least try the experiment of seeing if the river will not carry the debris off through the deepened channel. In the past he had fought the miners, but he felt that it was time for them to pull together, and he hoped to hit on something that would give both relief. He knew the condition, both in the mines and on the river, and would work with the miners to secure good results to both.

Senator Gleaves said that he understood that the proposition was to begin dredging at the lower parts of the river and work upward, and called upon Major Gillette of the United States Debris Commission to explain about the dredger.

Major Gillette said that he did not feel at liberty to speak on all subjects involved, especially for publication, as the commission of which he is a member is considering them and will in due time report on them. The big dredger has been used on the Mississippi for dredging and removing the bars. When the river is either at the high or low stage navigation is good, but when it is at medium height the bars impede navigation. The dredger pumps the sand out to one side and allows the river to deepen its channel by the force of the current. The dredger cost, he thought, $250,000, and will remove 8000 cubic yards of earth an hour, much more than any other machine has done. The river will not receive so much benefit from its taking the material out of its bed as it will from raising the banks, so that they can confine and carry a larger flow of water at flood height. They could not hope to take out enough of the detritus to hold down what is coming down from above. He had no figures to present on the cost of prosecuting the work. That is a subject on which the Debris Commission is working, and he was not at liberty to anticipate its report.

Engineer Price said that they should keep the river in its banks and let it help itself to deepen its channel. Do not expect the dredger to do all the work, but to help clear out the river and make it carry more water.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JAN. 5, 1897.

574,597.—AIR PIPE COUPLING—C. L. Bancroft, Brown's, Nev.
574,513.—WRENCH—J. A. Barker, La Canada, Cal.
574,655.—CHECK HOLDER—E. W. Beeman, Albany, Or.
574,703.—CHART—J. Bloch, Portland, Or.
574,599.—RAILWAY SYSTEM—Cladwell & Brittain, Seattle, Wash.
574,393.—BOX COUCH—R. G. Coates, Pasadena, Cal.
574,398.—PADDLE WHEEL—Mary A. Davis, Spokane, Wash.
574,788.—ORE FEEDER—M. Dillenberg, S. F.
574,410.—BICYCLE LOCK—C. A. Gay, Seattle, Wash.
574,730.—CAN—J. Gould Jr. Berkeley, Cal.
574 615.—CHALICE—V. M. Law, East Oakland, Cal.
574,490.—ACCOUNTING DEVICE—E. L. McClure, S. F.
574,450.—MOLD—F. A. Redmon, S. F.
574,825.—CAR COUPLING—H. B. Rogers, Sanger, Cal.
574,639.—GOLD SAVING DEVICE—J. & D. V. Snowgoose, Ashland, Or.
574,589 —ORE STAMP—C. W. Tremain, Portland, Or.
574,590.—FOOT SCRAPER—R. J. Trumbull, San Rafael, Cal.
574,644.—FAUCET FILTER—W. H. Vance, S. F.
574,595.—AIR AND GAS MIXER—N. White, Pasadena, Cal.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CAN.—James Gould, Jr., Berkeley, Cal. No. 574,730. Dated Jan. 5, 1897. This invention relates to that class of can heads which has flanges adapted to be fitted exteriorly to the can body, and especially those heads adapted by reason of a flange which may be torn open to be called "key-opening" cans. It consists essentially of a body and a head, the head having a deep flange to fit over the exterior of the body and having a portion between its lower edge and the angle formed with the top provided with an inwardly bent portion curved in cross section whereby its lower inner angle with the lower straight portion of the flange forms a positive stop to limit the projection of the head upon the body, a positive circumferential indentation of right angular form in cross section to produce a tearing line at the inner angles of the walls and at a point inside the outer periphery of the can head, whereby it is protected from accidental rupture.

DESIGN FOR PHOTOGRAPHIC CARD MOUNTS.—Paul J. Stuparich, San Francisco, Cal. No. 26,427. Dated Dec. 22, 1896. This invention relates to a design for card mounts and consists essentially of an embossed oval with a crown and branches imprinted upon a roughened surface in the angles of the card exterior to the central medallion.

RAILWAY RAIL JOINT.—Byron Jennings, San Jose, Cal. No. 573,980. Dated Dec. 29, 1896. This invention relates to a device for connecting the meeting ends of railway rails and making a bond and joint to prevent these ends being depressed by the constant passage of heavily loaded trains, and it serves to maintain the level and register of the rails. It consists of a base plate having a depressed section beneath the meeting ends of the rails, a curved spring equal to the depth of the depression, which fits therein, and when straightened out forms a continuous support in line with the higher portions of the plate, so that the rail practically rests upon those parts. In conjunction with these are side plates fitting and bolted to the webs of the rails with flanges bent with relation to the base plate so that the latter is retained in place and the spring maintained in its straightened condition in the chamber. If these rails are to be used to conduct electricity, as for electric roads, a copper surface plate may be extended across the joint so as to make a continuous electrical connection.

MULTIPLE SYRUPING MACHINE.—Frederick A. Robbins, San Francisco, Cal. No. 574,075. Dated Dec. 29, 1896. This invention relates to an apparatus for supplying syrup or other liquid simultaneously to a number of cans or vessels which are to be filled. It consists essentially of a plate, the upper surface of which is provided with horizontal passages, the outer ends of which passages connect with a series of discharge nozzles opening downwardly. The inner ends connect with circle holes or openings extending through a superposed plate and a spring-pressed valve turnable within a chamber upon said plate serves to close or open these passages by means of a lever fixed to the valve stem exterior to the case. Suitable stops in the line of travel of the lever indicate when the valve is opened or closed. This portion of the apparatus is supported above the table which is adapted to contain the cans, which are placed beneath the nozzles to be filled, and a tilting plate is so arranged that the cans resting thereon may be tilted to a certain angle so as to discharge a small portion of the syrup equally from all the cans. Below this tilting plate is a second table with converging grooves or passages, which receives the surplus syrup and returns it to a suitable receiver.

CONCENTRATOR BELT.—Wm. F. Bowers, San Francisco, Cal. No. 575,142. Dated Jan. 12, 1897. This invention relates to that class of endless concentrator belts which are made of rubber and are provided with rubber side flanges, being mounted so as to travel over terminal drums or rollers, and it is designed to overcome the difficulty and expense caused by the cracking and breaking down of these flanges when the belts are stretched in passing over the terminal drums. It consists particularly of a separate flexible reinforcing strip extending through the length of the flanges, this strip being substantially nonelastic. It is preferably made in the form of a cord of any suitable material.

BALANCED SLIDE VALVES.—Geo. R. Herricks, San Francisco, Cal. No. 575,155. Dated Jan. 12, 1897. This invention relates to a means for balancing slide valves of steam or other engines which operate under considerable pressure. It consists of a flanged valve adapted to slide upon the valve seat and open ports through which the steam or other medium is admitted to the engine cylinder. Around the channel formed by the flanges is a loosely fitting yoke which embraces the valve and which is connected with the actuating valve stem, this yoke taking up any irregular movements imparted by the valve stem and allowing the valve to work accurately at all times upon its face. Above the valve and upon the steam chest cover is a short open cylinder within which is fitted a piston. A rod connects this piston with a plate which fits above the valve and which prevents the direct pressure of steam upon the back of the valve, the connection between the piston rod and the plate being by means of a universal joint which allows the plate to always fit the valve with an even pressure. The area of the piston is just enough greater than that of the plate to counterbalance the weight of the piston and the plate and relieve the valve of pressure. In order to relieve the valve from the weight of the plate *E* and piston *B* when the engine is running down grade or without steam, a small cylindrical chamber is extended above the steam chest cover having a piston fitting within it and connected with the rod of the balance piston within the steam chest. A small opening admits steam beneath this small piston at the pleasure of the engineer to a sufficient amount to counterbalance the weight of the interior piston and the plate which ordinarily rests upon the back of the main valve. A central or adjusting screw passing through the steam chest cover is regulated so as to prevent an upward movement of the valve by any pressure liable to produce that result.

SOAP HOLDER AND BRUSH.—Geo. W. Johnson, San Francisco, Cal., assignor of one-third to Philip D. Raine, same place. No. 575,159. Dated Jan. 12, 1897. This invention relates to a device for holding and preserving soap so that it can be readily used at the washstand or point where it is needed, but cannot be carried away. It consists essentially of an indestructible open mesh netting, a hanger into which the mouth of the netting is gathered, and a means for locking it therein after the soap has been placed in the netting. The hanger to which the netting is attached has a swivel so that it may be turned about freely, and from this swivel a suspending cord extends upwardly, and is connected with a spring-actuated roller or with a weight, or by other means so arranged that it will be drawn up out of the way when not in use, but it can be drawn down with very little pressure so as to be used about the wash-bowl and bath-tub when desired. The netting may have a flexible backing fixed to one side with a brush which serves as a flesh or nail brush when desired, the whole forming a very convenient means for keeping the soap within convenient reach for use while preventing its being absolutely carried away from the place where it is to be used.

The New York Herald in its issue of January 3, 1897, devoted nearly a whole page to a notice of the under-mentioned work which it described as being "A Remarkable Scientific Memorial." It also stated that "Nothing more revolutionary than Dr. Emmens' memorial has been advanced in the name of science since the day when Sir Isaac Newton presented to the Royal Society his doctrine of universal gravitation."

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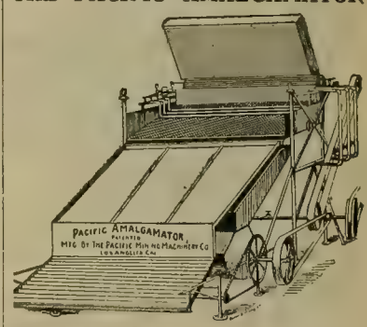
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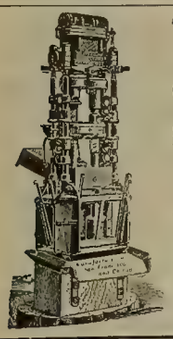
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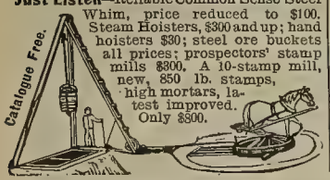
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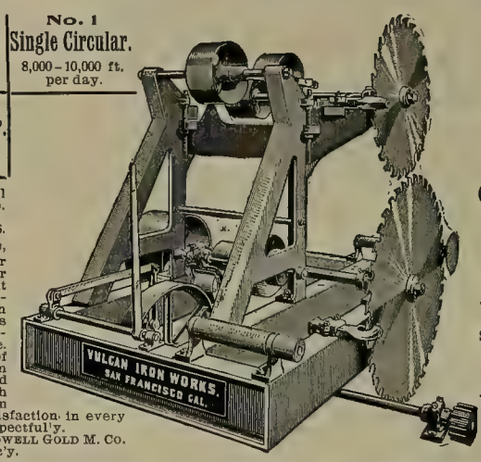
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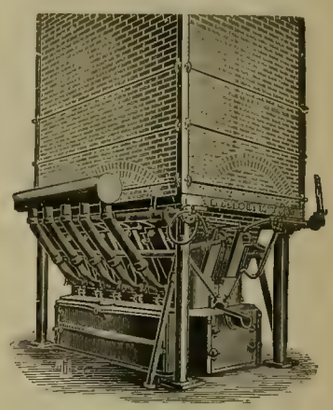
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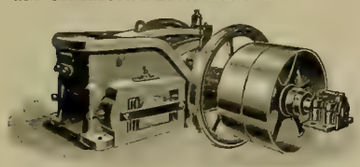
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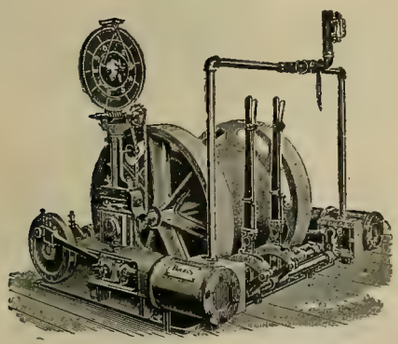
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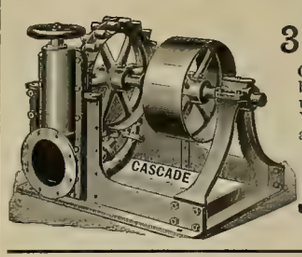
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The Russell Process.

For information concerning this process for the reduction of ores containing precious metals, and terms of license, apply to

THE RUSSELL PROCESS CO.,
Park City, Utah

Market Reports.

The Markets.

SAN FRANCISCO, Jan. 21, 1897.

Business is slowly reviving. The purchases so far indicate filling in so as to keep assortments up until personal visits are made to this city for the purpose of spring stocking. The buying of hardware, manufactured iron and similar lines promises to be larger this year than it was in 1896, owing to more building and railroad construction. The indications are at present there will not be any material changes in quotations. There will be also more machinery used for mining and agricultural purposes. So far the rainfalls and weather, not in this State alone, but throughout the Coast, have been all that could be desired, by even chronic pessimists, for the growing crop of cereals, fruits and vegetables. In the San Joaquin valley, southern part of the State and Arizona there has been a heavier precipitation and more generally distributed than for several years. The ground is wet to a considerable depth, which insures moisture for crops well into the spring months, even if there are no more rainfalls. The pasturage is reported better than for fully five years, which will benefit dairymen and stockmen. Prices for all kinds of farm products, unless we except dairy products, promises to average good figures the coming season.

The local money market continues to work on easy lines, with idle funds accumulating at banks. Owing to low rates of interest ruling at the East remitting is slow, but owing to light, comparatively, shipments of products to Eastern distributive points exchange is well maintained. The export value of clearances the past week to foreign and Atlantic domestic ports aggregates over $1,200,000, which is larger than in any one of last year. This is a gratifying showing, and is an important factor in providing more funds for investment purposes and also cancelling obligations. The East reports money still accumulating at New York. The rate of discount on call paper went down to a very low rate last week. Telegrams gave the rate as low as 1 per cent per annum. Short and long time loans were made at the rate of from 2 to 3½ per cent a year. Well informed parties at the East state that in New York fully $50,000,000 of sterling exchange have been borrowed against in that city. Never before in the financial history of the United States has so large a quantity been placed and held at any one time. This precludes any possibility of gold shipments for some time to come. Some authorities think there will not be any during the present calendar year. If it was not for tariff and money tinkering by Congress the very large surplus funds at the East would invite more general investment and speculation. In Europe money is easier but in good demand owing to continued improvement in business.

New York Silver Prices.

NEW YORK, Jan. 21.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	29 11-16	64¾
Saturday	29 11-16	64¾
Monday	29 11-16	64¾
Tuesday	29 11-16	64¾
Wednesday	29 11-16	64¾
Thursday	29 11-16	64¾

	Copper.	Lead.	Iron.	Tin.
Friday	11 75	3 02½	11 00@13 00	13 15
Saturday	11 80	3 05	11 00@13 00	13 20
Monday	12 00	3 07½	11 00@13 00	13 30
Tuesday	12 00	3 10	11 00@13 00	13 40
Wednesday	12 00	3 10	11 00@13 00	13 40

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	15c Prem
New York Telegraphic Transfer	17½c Prem
London Bankers' 60 days	$4.85¼
London Merchants	$4.84½
London Sight Bankers	$4.88¼
Refined Silver, per oz., 1000 fine	64¾
Mexican Dollars	51¾@52¼

SILVER.—Not within the past five years has the market value of the white metal held at steady prices for two consecutive weeks. The inquiry is fair. The East continues to report a free outward movement. The last steamer for the Orient took out for China $25,500 in bullion and $147,000 for Japan. Mail advices from London furnish the following review for 1896: The high point in silver for the year 1896 was 31 9-16 and the lowest 29¾; average, 30¾. India has been a steady buyer, except for a short time in October, when there was a check on account of the famine prospects. Japan has been a moderate buyer and the Continent has absorbed silver at intervals. The supply has been larger than heretofore, with the excess chiefly from the United States, which has shipped about £2,000,000 more than in the previous year. The imports and exports of silver for ten years follow:

	Imports Silver.	Exports Silver.
1887	£ 7,900,000	£ 7,830,000
1888	7,300,000	7,645,000
1889	10,500,000	10,668,000
1890	12,400,000	10,890,000
1891	11,800,000	13,300,000
1892	13,500,000	14,000,000
1893	14,900,000	15,500,0.0
1894	13,200,000	12,200,000
1895	12,500,000	10,400,000
1896, about	15,400,000	about 14,900,000

The movement of gold has been mainly against this country. Shipments to the United States have been about £10,500,000, while there has been a steady demand from Russia and Germany. Imports and exports for seven years follow:

	Imports.	Exports.
1890	22,568,000	16,000,000
1891	30,300,000	24,500,000
1892	21,470,000	18,060,000
1893	24,200,000	22,500,000
1894	27,600,000	17,200,000
1895	36,000,000	22,800,000
1896, about	24,700,000	about 32,000,000

MEXICAN DOLLARS.—The last steamer for China took out 186,199 dollars. Our market is fairly firm.

ANTIMONY.—Our market is quoted at 7½ @8c in a jobbing way. New York mail advices quote 7½c for Cookson's, 6¼@6⅝c for Hallett's and 6¼c for Japanese.

QUICKSILVER.—The market is practically unchanged, so far as the demand is concerned.

The market is quoted as follows:

Domestic trade, per flask	36 40

For export, quotations are nominal but less than for home.

COPPER.—The market is very strong at an advance, with still higher prices looked for. The consumption abroad is simply enormous, while in this country it is expected to steadily increase. The production, although very heavy, does not keep up to consumption.

The local market is quoted as follows:

Ingot, jobbing	14½@—
Ingot, wholesale	13½@—
Sheet copper	17 @—
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17c
Lake Superior Sheathing	20

LEAD.—Not to be behind copper and tin, lead is strong and higher abroad and at the East.

Pig	— @ 3 75
Bar	— @ 4 00
Sheet	— @ 5 25
Pipe	— @ 4 50

SHOT.—There is a moderate demand.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 20
Drop, B and larger sizes, " "	1 45
Buck, Balls and Chilled, do, " "	1 45

BORAX.—Shipments to the East are fair. The market is steady.

The market is quoted as follows:

Refined, in car lots	5
Refined, in sacks	4¾
Powdered, in car lots	4½
Concentrated, "	5

TIN.—The markets of the world are higher and strong. It is stated that the advance is due to a strong speculative bull campaign in Europe. In our market consumers are beginning to take hold.

Pig, per lb	14¼c@ —
Plate, I C coke, heavy, per box	— @$4 05
" " " light, "	— @ 3 95

IRON.—The market is practically unchanged. Imports are fairly free with a fair demand ruling. Late Eastern advices report that conditions are extremely favorable for consumption of iron and steel. Prices are very low, machinery is cheap, all other kinds of material are cheap, and labor is abundant. Lastly, the financial outlook is favorable. Prices may be expected to harden before long and therefore the favorable time for undertaking new enterprises involving consumption of iron and steel is the present. Bessemer pig at Pittsburg is showing considerable activity. Prices have been low, but an improvement is likely before long. Prompt iron at Valley furnace has sold $9.75. Steel billets have been offered at makers' mill below $15.50. There is not much chance of the Bessemer Association getting together again. In Alabama the continued selling of iron for export is the only feature. This kind of inquiry continues good.

We quote as follows:

AMERICAN.

	To Arrive.	Spot.
Sloss	$21 00	$23 50
Thomas	22 00	23 50
Salisbury	30 00	33 00

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—The market maintains a firm tone for cargoes of foreign in all positions. The consumption of all kinds is large.

We quote as follows:

SPOT FROM YARD—PER TON.

Wellington	$8 00@— —
Greta	6 00@ 6 50
Nanaimo	6 50@ 7 00
Gilman	5 50@ 6 00
Seattle	5 50@ 6 00
Coos Bay	— —@ 5 00
Cannel	8 00@—
Egg, hard	12 00@13 00
Wallsend	— —@ 6 50

TO ARRIVE—CARGO LOTS.

Australian	5 50
Liverpool Steam	6 25
Scotch Splint	—
Cardiff	6 25
Lehigh Lump	9 00
Cumberland	13 00
Egg, hard	10 00
West Hartley	6 50

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

LUMBER.—There is a continued free export movement. The home consumption promises to be large.

Redwood, Fluming	17 00	@	— —
Pine	14 00	@	19 00
Spruce	26 00	@	31 00

NAILS.—The market is unsettled and irregular at lower prices.

Wire, carloads, basis per keg			
" jobbing, " "			$2 40
Cut, carloads, " "			
" jobbing, " "			2 25

POWDER.—The demand is fair.

The market is quoted as follows:

Hercules, No. 1*, per pound	11½c
" No. 2, " "	8½c

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.	Secretary.
Alta S M Co, Nev	54	5c	Dec 14	Jan 18..Feb 8	J E Jacobus, 309 Montgomery
Anita G M Co, Cal	12	5c	Dec 21	Feb 1..Feb 18	L F Reichling, 404 Montgomery
Bullion Con G M Co, Cal	10	10c	Nov 30	Jan 11..Feb 10	C A Grow, Mills Bldg
Con Cal & Va M Co, Nev	7	25c	Dec 8	Jan 14..Feb 4	A W Havens, 309 Montgomery
Crown Point G & S M Co, Nev	69	10c	Dec 9	Jan 13..Feb 3	Jas Newlands, Mills Bldg
Eureka Con M Co, Nev	14	25c	Jan 18	Feb 23..Mar 15	H P Bush, 134 Market
Gould & Curry S M Co, Nev	80	15c	Dec 14	Jan 19..Feb 9	A K Durbrow, 309 Montgomery
Gray Eagle M Co, Cal	45	5c	Dec 23	Jan 30..Feb 23	W J. Gurnett, 308 Pine
Hale&Norcross S M Co, Nev	110	25c	Dec 8	Jan 11..Feb 1	R U Collins, 331 Pine
Hartmann Mining Co, Cal	1	5c	Dec 22	Feb 1..Feb 23	G W Peer, 4 Montgomery
Jamison M Co	9	5c	Nov 27	Jan 25..Mar 23	Sam W Cheyney, 120 Sutter
Julia Con M Co, Nev	28	5c	Jan 21	Feb 26..Mar 19	J Stadtfeldt Jr, 309 Montgomery
Marguerite G M & M Co, Cal	5	10c	Jan 14	Feb 25..Apr 8	Chas Peach, 237 Twelfth
Mineral Hill M & S Co, Cal	1	5c	Jan 4	Feb 15..Mar 25	Chas Peach, 210 Sansome
Ybarra G M Co, Lower Cal	6	10c	Dec 4	Jan 6..Jan 25	Jas Coffin, 132 Market
Reward G M Co, Cal	17	3c	Dec 19	Jan 20..Feb 5	S W Backus, Mills Building
Thorpe M Co, Cal	5	5c	Jan 13	Feb 23..Mar 15	A F Frey, 44 Phelan Building
Utah Con M Co, Nev	24	5c	Jan 14	Feb 17..Mar 8	A W Havens, 309 Montgomery

Mining Share Market.

SAN FRANCISCO, Jan. 21, 1897.

The market which had been gaining strength since the commencement of the current month, strengthened very materially on Saturday under good buying. Monday morning there was a bulge, prices advancing 20 to 40 per cent over Saturday's closing. The advance was short lived for under active selling by shorts and realizing sales of holders Chollar broke from $1.30 to $1.00, Con. Virginia from $1.85 to $1.65. The rest of the list receded proportionately. The decline continued Tuesday morning, when Chollar sold down to 81 cents, Con. Virginia to $1.55 and the others fell off in about the same porportion. In the afternoon of that day a steadier feeling prevailed owing to a stronger tone in Con. Virginia. Yesterday there was free buying of the shares of that mine which advanced the price to $1.85 and $1.90. The balance of the list, outside of the Gold Hill shares, strengthened in sympathy. The latter were weak owing, it is said, to holders getting out so as to buy elsewhere. The bulge in the market on Monday and the rapid break came as a surprise to the large majority of dealers. The quick move up and then down was hailed by brokers as a harbinger of better times for it looked very much to them as if it was being worked by others than chippers and room traders assisted by one or more small pools. There is no person who wishes a bull campaign more earnestly than a stockbroker, for higher prices and active moves bring in outside traders which means commissions for buying and selling. While the market acts well yet it does not have the right ring to it. It does not look as if there are persons back of it who have the means to promote and sustain a bull campaign for a longer duration than a few days. The advance yesterday in Con. Virginia was due to reports of an improvement on the 1000-foot level which brought in outside buyers, all eager to take the shares off the hands of better informed and larger operators. At this writing it looks as if prices may possibly go slightly higher so as to encourage holding and also more outside buying, for assessments must be levied and collected. Experience has taught that no large body of ore has ever been allowed to be discovered, so far as made public, when prices were low, and it is not at all likely that this rule will be changed in the future.

Official letters from the Comstock mines continue to report work being pushed mostly to the west. For the very few miners at work there is a good deal of exploiting and deadwork done. A reduction in men, which has been made from time to time, has been done on the plea of economy, so as to cut down expenses, by which the levying of assessments would not come so often. While this is the reason stated for so few men at work, yet persons in position to judge what is going on in the market, and also what can be done in the mines, if desired, unhesitatingly state that it is for the purpose of killing time and disgusting outside holders so they will sell. In every mine on the Comstock fairly fast work is done when it is in the direction where they do not expect to strike ore, but, if it is in the direction of ore, then a snail's pace is fast in comparison.

In Utah they are running an east cross-drift, but on what level the letters do not say.

In Sierra Nevada they are running a west cross-drift on the Layton tunnel level, and on the 900-foot level they are extending an east cross-drift and a north lateral drift. In Mexican they are running a north drift and also west cross-drift on the 1000-foot level. In Ophir they are raising from the central tunnel level and running a west cross-drift on the 1000-foot level. In all the above they find nothing but porphyry and clay seams. In Con. Virginia they are running a cross-drift from an upraise from the 1000-foot level, near the Ophir line. It is in this cross-drift that reports say there is an improvement. On the 1650-foot level they are casing timbers. On the 1750-foot level active work is being done in several directions. Best & Belcher and Gould & Curry are still running a joint east cross-drift. In Hale & Norcross work is confined to the 900-foot and 975-foot levels. A few tons of ore were raised last week. From Savage no change is reported in the work being done. No work is reported in Chollar and Potosi. In Bullion work is being done on the north lateral drift, while in Alpha they are still fooling away time on the 500-foot level, so as to show others how not to find ore even when it is near at hand. The work in Con. Imperial and Confidence is unchanged. Work was resumed in Crown Point last Saturday. Discreet silence is maintained regarding the work in Belcher and Seg. Belcher. It is the opinion in well-informed mining circles that this silence is due to their having found considerable ore, which they are trying not to let others know about until outside shareholders are assessed out of their shares. Overman reports raising a few tons of ore. They have succeeded in getting away from the ore in Alta, which the superintendent is reported to have said he would strike.

News from the Brunswick lode is confirmatory of what the MINING AND SCIENTIFIC PRESS said about Chollar. We then stated that when they commenced extracting ore it would meet all expenses. This is proving to be the case now, and when they increase the output still more (112 tons were raised last week) then better results will follow. This very extracting of ore takes the shares of the mine out of the market as a gamble, for it is uncertainty and assessments that are the main factors in promoting better and active times, provided the bulk of shares are well in hand. In Chollar they are working on the 200-foot, 300-foot, 400-foot and 500-foot levels.

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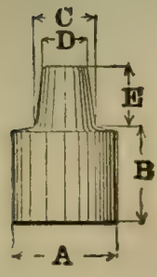
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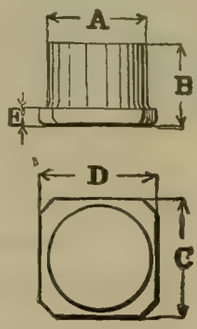
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In the first four they are taking out ore. On the 400-foot level they are sinking to the 500 level so as to make connection for ventilation with the south drift that is being run on that level. In Occidental work is confined to the levels reported last week. Nothing of importance has been struck. In Savage the work is on the 400-foot level. The work in Best & Belcher and Gould & Curry is in the same direction and on the same levels reported last week. It is rather singular that in no mine, outside of Chollar, have they been able to find paying ore. Perhaps it is not desirable. The Chollar letters are explicit and all that can be desired, so far as we know, by shareholders. Some of the companies on the Comstock could follow them with advantage to shareholders and, at the same time, disarm criticism and promote confidence that the mines are honestly worked.

The following illustrates the changes of the week:

MINES.	Jan. 14.	Jan. 21.
Alpha	.....	$ 13
Alta Consolidated	$ 08	08
Andes	.....	15
Belcher	45	42
Best & Belcher	55	75
Bodie	.....	.....
Bullion	.....	.....
Challenge	57	47
Chollar	84	94
Confidence	1 30	1 10
Consolidated California and Virginia	1 30	1 95
Consolidated New York	.....	.....
Crown Point	35	35
Exchequer	.....	.....
Gould & Curry	42	42
Hale & Norcross	.....	1 30
Justice	.....	.....
Mexican	41	52
Ophir	95	1 20
Overman	13	14
Potosi	53	61
Savage	24	29
Sierra Nevada	44	53
Union	38	.....
Utah	.....	04
Yellow Jacket	34	34

San Francisco Stock Board Sales.

SAN FRANCISCO, January 21, 1897.

9:30 A. M. SESSION.

800 Andes	15	900 Mexican	52
100 Belcher	42	400 Occidental	16
600 Best & Belcher	75	600 Ophir	1 20
300 Challenge	47	1000 Overman	14
100 Chollar	94	200 Potosi	61
920 Con Cal & Va	1 90	200 Savage	29
300 Crown Point	35	800 Sierra Nevada	53
600 Gould & Curry	51	300 Utah	04
150 H. & N	1 30	300 Yellow Jacket	34

SECOND SESSION—2:30 P. M.

700 Ophir	1 20	600 Confidence	1 10
250 Mexican	49	100 Sierra Nevada	50
400 Gould & Curry	52	450 Seg Belcher	10
150 Best & Belcher	75	500 Overman	13
1070 Con Cal & Va	1 95	150 Alta	08
100 Chollar	94	300 Challenge	44
300 Crown Point	32	300 Occidental	16
300 Yellow Jacket	34	500 Syndicate	02
200 Alpha	13	30 Potosi	58
600 Belcher	38		

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Rainfall and Temperature.

The following data for the week ending 5 A. M., January 20, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week	Total Seasonal Rainfall to Date	Total Seasonal Rainfall Last Year to Same Date	Average Seasonal Rainfall to Date	Maximum Temperature for the Week	Minimum Temperature for the Week
Eureka	.44	23.48	19.34	21.83	58	34
Red Bluff	.27	11.84	9.24	13.63	60	34
Sacramento*	.70	7.09	9.11	9.93	52	34
San Francisco	.03	11.14	7.77	12.37	56	41
Fresno	.08	4.73	2.03	2.99	56	32
San Luis Obispo	.23	9.70	7.82	....	68	32
Los Angeles	.84	8.40	2.86	10.98	64	32
San Diego	2.22	6.52	1.65	4.84	64	42
Yuma	2.16	4.62	.32	1.90	64	42

*Up to 5 P. M. January 19; furnished by J. A. Barwick.

Commercial Paragraphs.

THE Walker Company, of Cleveland, Ohio, has a contract to install an electric plant in the Waldorf hotel, New York city—the largest isolated plant in the world. It will be able to develop 50,000 lights.

THE Fort Wayne Electric Corporation has secured the services of Mr. Samuel H. Taylor, one of the pioneer electricians of the coast. As representative of the Thompson Houston Company, and later connection with the Edison Light and Power Co., Mr. Taylor has acquired a wide acquaintance and high standing among electricians and business men.

THE Rand Drill Company has shipped to the Le Roi Mining Company, Rossland, B. C., the largest air compressor ever built in Canada. The engines are Corliss compound condensing. The two steam cylinders are 22-inch and 40-inch diameter by 48-inch stroke, while the two air cylinders are 22-inch and 34-inch diameter; the crank shaft which drives the machine is 12 inches diameter; the fly wheel 10 feet in diameter by 40-inch face.

THE result of last year's operations by the F. M. Davis Iron Works Company, Denver, Col., is an indication of the advancement in the mining industry throughout the West. In the manufacture of mining machinery the value of its product for 1896 has nearly doubled that of the three preceding years respectively, requiring the addition of 4500 square feet to the machine shop, giving to the establishment now a ground floor space of 39,500 square feet. The various products of the company are sold mostly in Colorado, while a steady market is maintained in New Mexico, Arizona, Utah, Idaho, Nevada, Montana and old Mexico.

UNDER the pressure of a growing demand for rubber goods the San Francisco branch of the Goodyear Rubber Company has enlarged its warerooms and offices and now occupies the entire building, from roof to basement, on Market street, numbering 573, 575, 577, 579. The interior is fitted with the latest appliances for handling the business. Every imaginable thing manufactured from rubber is represented in the large stock which the company carries. Special mention may be made of the full line of firemen's supplies, hose, belting, packing, and the celebrated "Crack-Proof" pure rubber boot, designed especially for severe use in the mines or for hunting. Catalogues from any of the different departments will be sent on application.

Assessment Notices.

HARTMANN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Chili Gulch Mining District, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 22nd day of December, 1896, an assessment (No. 1) of 5 cents per share was levied upon the issued capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 46, No. 4 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of February, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before will be sold on TUESDAY, the 23d day of February, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

G. W. PEER, Secretary.

Office—Room 46, No. 4 Montgomery street, San Francisco, California.

MINERAL HILL MINING AND SMELTING CO.—Location of principal place of business, San Francisco, California; location of works, Spenceville, Nevada County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 4th day of January, 1897, an assessment (No. 1) of five cents (5c) per share was levied upon the whole of the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 210 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of February, 1897, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 25th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. PEACH, Secretary.

Office—210 Sansome street, San Francisco, California. Office hours from 1 to 3 o'clock P. M.

MARGUERITE GOLD MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of January, 1897, an assessment (No. 5) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 8th day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. PEACH, Secretary.

Office—237 12th street, San Francisco, California. Office hours from 4 to 6 o'clock P. M.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 13th day of January, 1897, an assessment (No. 5) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of February, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

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The names of the great bonanzas of Tintic, the Mammoth, Centennial-Eureka, Bullion-Beck, Eureka Hill and Gemini are recognized everywhere that the mining industry is known. The four former have each a record exceeding $1,000,000 in dividends and the latter of over $600,000.

Until within the last two or three years no adequate means of reduction of Tintic ores was in operation in the district and the production of the mines was limited to those ores sufficiently rich to be shipped to the smelters for treatment, but this has been changed by the erection of immense combination and concentra ion milling plants which can work at a profit those immense deposits of low grade ores which fill all the producing mines of the district. Four of these mills are in active operation, and three others will undoubtedly be erected within the next year.

The ores of Tintic are greatly diversified in character. The principal metals produced are gold, silver, copper and lead. In silver production Tintic leads the State, while in the production of gold it stands second on the list. Beside the big bonanzas above mentioned there are some twenty-five or more properties that now and in the past have been producing mines, and to these may be added a score of others which have paid for their development by their products, and upon which the recent revival of the mining industry has had the effect of a recommencement of operations.

Tintic has four thriving towns—Eureka, the business center of the district, with a population of 2,500; Mammoth, population 1,000; Robinson and Silver City, 500 each, all of which offer great inducements for investments in a business way.

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As to the future of Tintic, it is no exaggeration to say that it possesses the brightest prospects of any mining district in Utah, and offers to the prospective inventor opportunities which cannot be excelled.

The Rio Grande Western Railway has a double daily train service between Salt Lake City and the Tintic Mining District. For further particulars apply to F. A. WADLEIGH, General Passenger Agent, Salt Lake City.

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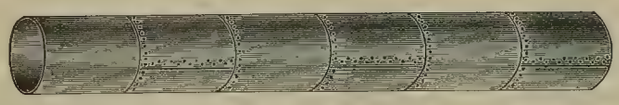
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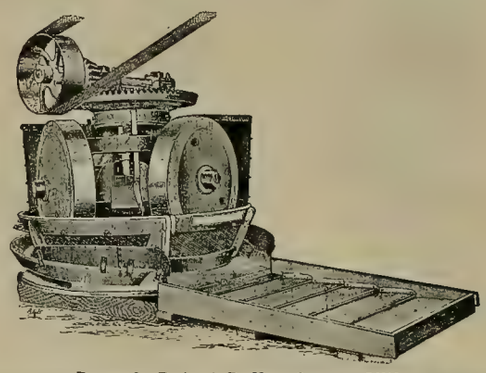
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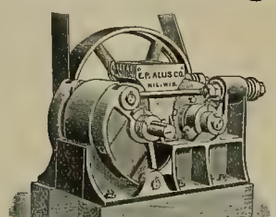
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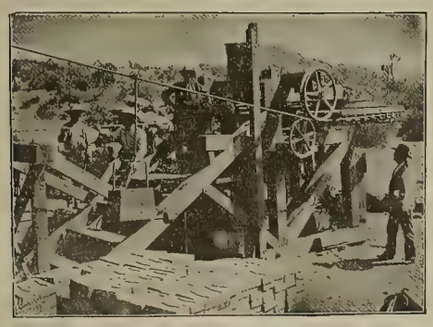
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No. 1908.—VOLUME LXXIV. Number 5. SAN FRANCISCO, SATURDAY, JANUARY 30, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Protect the Mine Laborer and Supply Men.

It is proposed to secure the enactment by the present California Legislature of a law requiring those who work bonded or leased mines to file with the county authorities bonds for the payment of the labor employed and supplies furnished. Owing to the inefficiency of the mechanics' lien law as it stands at present on the statute book and emasculated by the Supreme Court, the laboring miner has very little protection, and hardly a week passes in which there is not reported a case where laborers have been left without their pay and with no means of securing it from the property itself. Now a lien will not lie against a mine covered by an agricultural patent nor according to a recent decision of the Supreme Court, for work done in any mine in taking out ore even in prosecuting development work, but only in dead work. Nor will a lien lie against a mine held under a Mexican grant. A good lien law covering all work done by laborers in all mines would be satisfactory to the mine owners and give ample protection to the miners. The proposed law providing for a bond from others than owners who are working any mining property would then be of value only to those supplying material, provisions, etc. At present comparatively irresponsible people often bond mines, work them a short time, obtaining credit from supply men, and if the work does not develop values leave the laborers and other creditors unpaid. The worst of this to the supply men is that these laborers often run up bills at the local stores which they cannot pay. It is well known that, owing to losses through the almost universal system of credit throughout the mining districts, prices at local stores are out of proportion to the cost of the goods sold. This works a hardship on whole communities. It does not seem that requiring the proposed bonds would work a hardship upon any one and it should do much good. However, what is wanted most of all is a lien law for the working miner. This has been recommended by the Governor and by the Labor Commissioner.

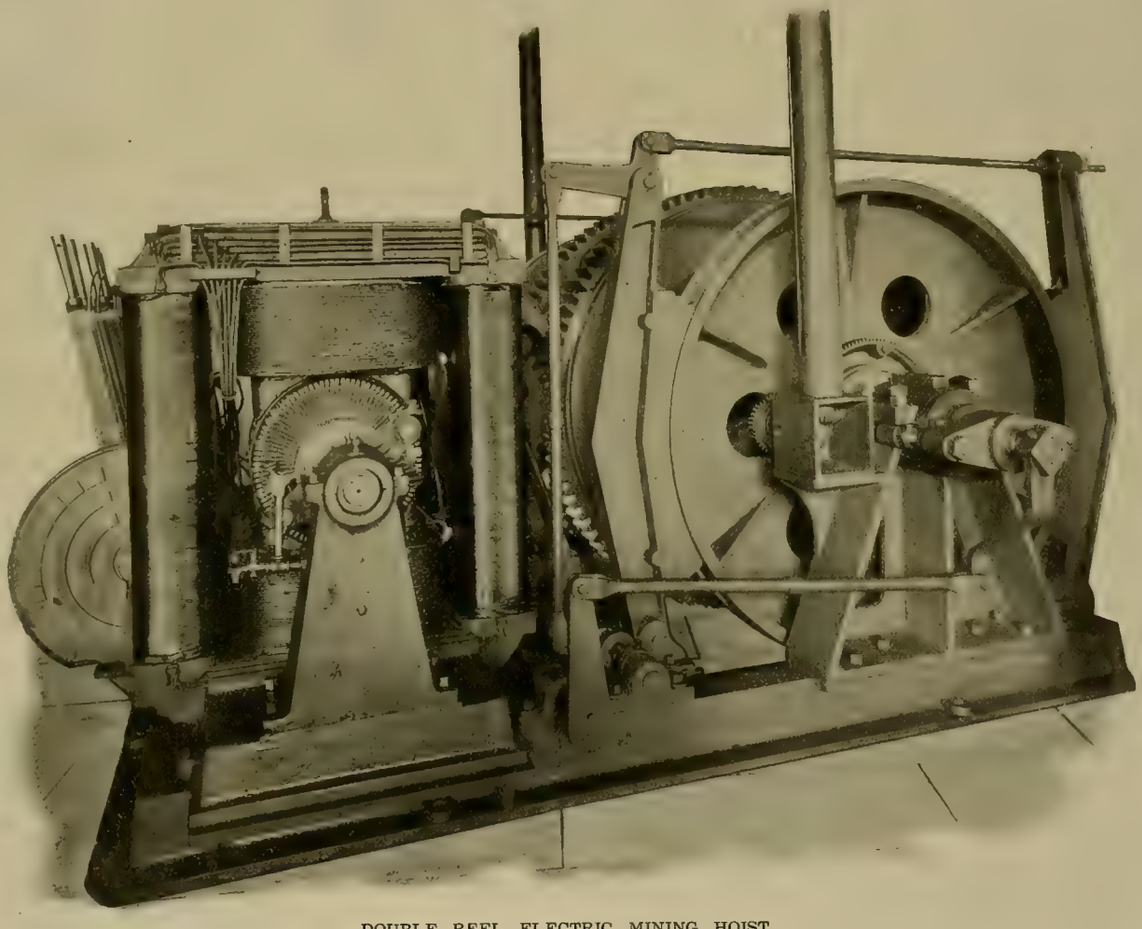
Deep Shaft Sinking.

A suggestion has been made that some of the mine owners in the Trail Creek district, in British Columbia, combine for the purpose of sinking rapidly a deep shaft in one or more representative claims for the purpose of demonstrating whether the ore bodies hold out in size and value with depth. The suggestion is a good one. The sinking of the Kennedy shaft in Amador county, California, to a depth of 2200 feet, and the proof thereby that the ore body is as large and rich as in the upper levels, has done much to increase the values in the minds of the owners of properties on that belt for a long distance. Had this been done years ago there would now be many more deep shafts along the Sierras than there are now.

In South Africa the deep shafts are proving the value of the mines in depth, and as a result there is no hesitation about sinking on other mines at very great expense. There they had the advantage of large capital which is not as available in this country. A large majority of the mines are being worked by men of small means who can hope to make developments at great depth only out of the profits of the upper workings. Randsburg, in the Mojave desert, is a good example of this. With the most promising outlook on the surface, none of the mine owners have sunk deep enough to prove what they believe that the mines will hold out in depth.

Electric Mining Hoist.

The engraving on this page and the one on page 92 represent an improved type double-reel electric mining hoist, manufactured by the Electrical Engineering Co. of this city. The moving parts are all mounted on cast-iron bed plate and are self-contained. The drums are 40 inches in diameter, with 24-inch face, having deep flanges to contain from 1500 to 2000 feet of three-fourths inch rope. Each drum is independent of the other, and may be thrown in or out while the gears are in motion, and each is provided with bronze bushings, which may be replaced in case of wear and new ones substituted therefor. It will be noted that on the end of the intermediate shaft there is a gypsy, to be used in loading timbers, or other heavy bodies into the skip or cage. The motor is of the latest bipolar commutated field type, where rheostat resistances are entirely dispensed with, whereby the greatest possible torque in starting at slow speed is obtained. The center lever controls the car speed, operating it at from 50 to 500 feet per minute, having seven different speeds in all, and being reversible.



DOUBLE REEL ELECTRIC MINING HOIST.

The Mineral Land Bill.

So far Congress has taken no action in regard to the Mineral Land Bill, and nothing can be done unless the Speaker consents to allow time for its consideration at this session. The Secretary of the Mineral Lands Committee of the California Miners' Association wrote last month to each member of Congress from all the mining States and Territories, and to his letter replies have been received from nearly all of them, expressing their desire not only to vote for the measure but to do all in their power toward securing its passage. More than that, those most familiar with the state of affairs say that they believe that there can be little doubt of its passage, if it is allowed to come to a vote. A number of energetic members from this and other States are doing all they can to bring this about. All depends upon their influence with the Speaker.

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J. F. HALLORAN.....General Manager

San Francisco, January 30, 1897.

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Proposed Corporation Bills.

There have been introduced in the State Senate three bills which contain some features that will be of value and others that seem iniquitous. One of these, Senate Bill No. 322, is to amend sections 307 and 312 of the Civil Code of California as to the use of proxies in meetings of stockholders of corporations. It provides that no proxy shall be voted unless it be that of the actual bona fide owner of the shares, whether they shall at the time stand on the books of the corporation in the name of the actual owner or not, and declares that brokers or persons holding stock as security are not actual bona fide owners in the sense of the bill.

There has been some litigation as to the right of the latter class—persons holding stock as security—voting such shares. It would seem that, in this respect, a statute defining the rights in the premises should be passed. But this bill goes too far and provides that those in whose names shares are placed as trustees may not vote them through proxy. It practically takes away from the shareholder the right to delegate his authority to others.

Another bill amending the present law provides that monthly instead of weekly statements shall be made by the secretaries of all corporations for the stockholders, and that any stockholder shall be entitled to visit the property of the company with his expert and make full examinations.

A third bill amends sections 332 and 342 of the Civil Code. The new provisions as to section 332 are that no assessments may be levied by the board of directors without the concurrence of a majority of the stockholders at a meeting called by the board of directors for that purpose, and that no assessment shall be levied unless the board of directors has first made a report to the stockholders, under oath of the president and secretary, of the actual financial condition of the property and containing itemized statements of the expenditures of money derived from the last assessment. Such a law would do much toward securing better and more honest management on the part of directors.

But that part of the same bill amending section 342 of the Civil Code does not seem to promise to serve any good purposes. It provides that the owner of any stock sold to another at a delinquent sale for assessment may redeem it, at any time within six months, upon paying all costs and ten per cent additional. In the nature of things, the value of mining stocks are more variable than most other property, and the passage of such a bill would give an unfair advantage to the delinquent in many cases.

Laws Framed by Miners.

At a miners' meeting in Randsburg last week a new set of rules and regulations were prepared for adoption by the mining district. These should be worth the consideration of those interested in legislating for the miner. There was adopted in the earlier days of the camp a set of rules and regulations which were found to be unsatisfactory. As the Randsburg *Miner* says:

"It has been found that the present customs are somewhat faulty, and it is the desire of those who come to this camp to mine and work in good faith to be protected. As hundreds of claims are staked and monumented without the least sign of ledge matter or 'mineral in place,' a law or custom is desired to compel a certain amount of work to be done before a claim can be recorded. By this means it is hoped to balk the 'claim grabbers,' some of whom have as high as thirty claims each located, and who at the end of each thirty days put a new certificate of location on the claims and hold them at high figures, keeping out the men who would develop."

Now, in Randsburg district this miners' meeting was composed of men of experience in other mining camps of this State and of other States and Territories. It is safe to say that the meeting had the advantage of the advice of men who knew the faults and good points of nearly all the mining laws and district rules and regulations on the Pacific coast. They were earnest men, interested in the welfare of their camp and their own better protection. The circumstances are so similar to those of all other mining camps of this State, that rules as to locations which would be suitable for them would be suitable for any other district in California. The principal sections of these rules and regulations are as follows:

Every location of a mining claim made in said district shall contain: First, the name of the claim; second, the name of the locator or locators; third, the date of the location; fourth, the number of feet in length of said claim, and the number of feet claimed on each side of the center of discovery shaft lengthwise of the claim, and the number of feet claimed on each side of the discovery shaft crosswise of the claim; fifth, the general course of the lode or premises, as near as may be; sixth, the locality of the claim with reference to some natural object or permanent monument as will identify the claim.

SEC. 3. Before filing the location certificate with recorder of the district the discoverer shall locate his claim: First, by sinking a discovery shaft upon the premises so claimed to a depth of at least 10 feet from the lowest part of the rim of such shaft at the surface, and deeper, if necessary, until there is shown by such work a lode or deposit of mineral in place; second, by posting a notice at the point of discovery, on the surface, said notice so posted substantially conforming to the location certificate; third, by marking such claim or premises on the ground, so that the boundaries shall be marked by not less than seven substantial posts projecting not less than 3 feet above the ground, or by substantial stone monuments at least 3 feet high, to-wit., the initial or discovery monument or post, one at each corner of the claim, and one at each end center thereof.

SEC. 4. Any open crosscut, cut, adit, or tunnel which shall be made as above provided for as a part of the location of a mining claim, and which shall be equal in amount of work to a shaft 10 feet deep from the lowest part of the rim of such shaft at the surface and 4 feet wide and 6 feet long, and which shall cut a lode or body of mineral in place at the depth of 10 feet from the surface, shall be equivalent, as discovery work, to a shaft sunk from the surface, as hereinbefore mentioned.

SEC. 7. Within three (3) months after the expiration of the period of time for the performance of annual labor, or the making of improvements upon any mining claim or premises, the person on whose behalf such work or improvements were made, or some person for him knowing the facts, may make and record, in the office of the district recorder, an affidavit.

Then follows the form of the affidavit to be made.

Section 8 deals with the relocation of forfeited and abandoned claims, and provides that they shall only be made by sinking a new discovery shaft and fixing new boundary lines, the same as in making a new location, or the relocator may sink the original discovery shaft 10 feet deeper and erect new monuments, and shall state in the location certificate if the whole or any part of the relocation has been made on abandoned property.

These rules and regulations, it may be seen, are almost identical in their meaning to the similar sections of the bill proposed by the MINING AND SCIENTIFIC PRESS, published Oct. 31, 1896, and submitted for the consideration of the miners and the Legislature. A district such as Randsburg, with good rules and regulations, will not have the need for a general law for the State, of course, that will many other parts of the State, where there are no district rules and regulations in force. In a recent decision of the Supreme Court, in the case of Howeth v. Sullenger, in which it is said that where a claim is *not* in a mining district, any marking of the boundaries so that they can be readily traced, is sufficient; and stakes and stone monuments set at each corner of the claim and in the center of each end line, with one or more notices of location sufficient for identification of the claim, is a compliance with the statute. And the Supreme Court of Nevada holds that such marking is sufficient under the strongest construction of the Act of Congress. But the miner does not want to go to the court decisions to learn what should be done.

Foreign Capital.

It would hardly seem necessary to present to foreign capitalists any further argument in favor of investing in mines in the United States and British Columbia in preference to South Africa and Australia than that, while millions have within a few years past been poured into the gold fields of these two continents and very little has come this way, the output of gold has increased some 25 per cent in America within a year and has fallen off in Australia and barely held its own in Africa. This, it seems, is beginning to be appreciated, for there is a livelier interest taken now in London as to the mines of British Columbia than any other field.

It is often asked why British capital does not more eagerly seek investments in mines in the United States. Of course, one reason is that there are closer relations in business and otherwise between the British and the other gold fields, which are in their own colonies, or, as in the case of Africa, in condition to be controlled by them. But here the Briton must take the conditions as he finds them. However, probably the fact that the best gold miners in the world are here, the values of properties placed upon them by their owners are nearer their real worth, and there is far less opportunity for speculation, has much to do with deterring foreigners from comming here for mines.

However, of late the tendency of English investors in foreign mines has been to secure properties, not for speculative purposes, but rather as pure investments. It is this class of purchasers that will turn rather to America than to Australia. They are learning that better opportunities for paying investments are to be found in the older mining districts than in the new. They learn that too often the prices on mines in new districts are "boom" prices, and it is to be observed that of the investments made by foreign capital in America during the past year a large proportion has gone into old districts, and in the purchase of well-developed mines. It is, on the other hand, American capital that is developing the new mining districts.

The Mining Bureau.

It is time that some active steps were taken by the California Miners' Association and other representatives of that industry toward securing proper appropriation for the future maintenance of the State Mining Bureau. The miners have never asked for much legislation expensive to the taxpayers of the State—be it said to their credit—but what they have asked for has been of value not only to the mining industry, but to the whole commonwealth. The California Miners' Association, since its organization, has done much in securing legislation of value, but few of their bills have carried appropriations. The importance to California of mining will justify the Legislature in passing the small appropriation required without much question. No other industry has done more for the State's progress nor asked less aid.

Concentrates.

A LOT in Randsburg, Cal., has been sold to a woman for $1250.

MOLYBDENITE has lately been discovered in Utah, not far from Salt Lake.

THE new mining exchange in Spokane, Wash., held its first public call on Jan. 18th.

A TEN-STAMP mill will shortly be erected at the Shawmut mine, Tuolumne county, Cal.

A 500-HORSE POWER engine is to be erected at the De Lamar mine, Pioche county, Nevada.

THE shaft of the Congress mine in Arizona is now down 1700 feet and has been in pay all the way.

A COMPANY has been formed to work gold dredging machines on the Saskatchawan river, in Canada.

THE gold output of Esmeralda county, Nevada, for 1896 was $300,000, according to the *Territorial Enterprise*.

THE Colfax, Cal., *Sentinel* prints a list of 134 gold mines that receive merchandise and machinery at that point.

THE first big sale of the year at Cripple Creek was that of last week for $85,000 of the Mollie Belle to Eastern capitalists.

A GARDENER in Santa Barbara, Cal., claims that he has discovered the long lost Padres mine in the mountains of that county.

LARGE deposits of silver ore with gold have been discovered within a few miles of Chihuahua, Mexico, on the hacienda Tabuluoplo.

A BILL is going through the Idaho Legislature to prevent Idaho mine owners from running stores in connection with their mines.

IT is reported that the intention of the owners of the De Lamar mine in Nevada is to increase the daily capacity of the mill to 500 tons.

A. C. MASSEY has leased a tract of land on the Juristac ranch near Sargent's Station, Santa Clara county, with the intention of boring for oil.

THE Jerome *News* is authority for the statement that the net profits of the United Verde copper mines at Jerome, Arizona, for 1896, were $3,500,000.

EASTERN people are experimenting with the low-grade ores of Bingham, Utah, of which there are immense bodies, and which have so far defied profitable treatment.

CONSIDERABLE capital has lately gone into the Lake of the Woods district in Ontario, Canada, where there are now 145 stamps working and some 50 more are being put in.

AN experimental plant is being erected in Salt Lake, Utah, under orders of Charles Butters, for testing the Siemens-Halske cyanide process he represents on Utah ores.

THE Oroville *Mercury* claims that the miners of Butte county, California, produced $250,000 more in 1896 than in 1895, when, according to the mint estimate, it was $473,672.

THREE years ago some English capitalists obtained a group of gold mines at El Perral, Chihuahua, Mexico, and have developed 300,000 tons of ore. A smelter has been erected.

MANY miners in Mexico are going to the State of Sonora, on account of the increased activity there. The superintendent of the Poloma mine lately sent for 100 men for his property.

ON Texada Island, British Columbia, in the Van Anda mine, owned by Victoria and Chicago capitalists, it is claimed that the ore runs 60 to 70 per cent in copper, besides carrying gold.

THE proceedings of the fifth annual convention of the California Miners' Convention have been printed in pamphlet form for distribution among the members by Secretary Julian Sonntag.

PROPOSITIONS for running the branch tunnel to American Flat have been made to the Comstock Tunnel Company, and many of the influential mining men are actively advocating the scheme.

THE Colorado State Bureau of Mines has issued an order "prohibiting the continued use of iron or steel tamping bars in mines in that State for the purpose of driving powder into drilled holes."

AFTER the 1st of July, 1897, any blank card of proper size may be mailed by attaching a one-cent stamp, and will answer the purpose of the present official postal card as a medium of correspondence.

IN answer to a subscriber regarding the statement as to "the deepest bore-hole in the world," the exact depth of the one at Paruschowitz, Upper Silesia, is 6,572.71 feet from the surface of the soil.

THE Exploration Company of London, since it purchased control of the Helena & Frisco mine in Idaho, has been negotiating for control of several other big silver-lead mines in the Cœur d'Alene district.

THE Pueblo, Colorado, smelter made a shipment last week of eighteen car loads of lead to Liverpool, England, via Galveston. The ores from which the lead was smelted came from British Columbia in bond.

DURING last month the Alaska-Treadwell mine milled 13,736 tons ore and treated 416 tons sulphurets. The bullion yield was $43,096, of which $17,338 was from sulphurets; average yield of ore, $3.14 per ton.

A WOMAN is a candidate for the position of Mining Recorder of the Georgetown district in El Dorado county, Cal. The election is to be held in a corner saloon, and, if successful, she will choose other headquarters.

DURING '96 the Argentine mines, South America, yielded, silver, 1,042,492 pounds; gold, 22,462 pounds, and of copper, 857,780 pounds, most of which was shipped to France, Germany, England, Belgium and Italy.

AT Kamloops, British Columbia, to the north of Coal hill, in which the copper-gold ores exist, has been discovered asbestos, but the deposits have not as yet been sufficiently developed to determine their extent and value.

THE topographical survey of the Tintic district, Utah, by the United States Geological Survey, is being made on a scale of 800 feet to an inch, with contour intervals of 20 feet, the map covering an area of twelve square miles.

THE Exploration Company of London, which lately purchased the Tomboy at Telluride, Colorado, is preparing extensive operations and will expend $300,000 in improvements. As soon as possible the output of the mine will be doubled.

THE Burcham group of mines in Randsburg, Cal., has been taken over by a corporation formed under the laws of Colorado with a capital of $1,500,000, with shares at $1 each, par, and non-assessable. The company proposes to erect a mill and bring water in from Cuddaback lake, where it will bore wells.

THE site of the new town of Stent, in Tuolumne county, Cal., is situated on a quartz claim located in 1894 and on which the necessary assessment work has been done since, but which was not known of when the town was built up.

ASSEMBLYMAN POWER of Placer introduced in the Legislature last Wednesday the bill proposed by the California Miners' Association, supplementing the Federal Statutes as to locating mining claims and perfecting titles to them.

THE Mountain Copper Company of Shasta, Cal., is arranging to add to its possessions the Balla Klallala or Windy Camp mines to the Iron Mountain group. This, if carried out, will cause the building of another railroad six miles in length.

A TELEGRAM from Tacoma, Wash., states that Alaska and Puget Sound merchants and the steamship companies are preparing for an influx of 10,000 to 15,000 miners into Alaska this spring. Last year about 5000 men went north to the mines.

IN the California Legislature the Committee on Mines and Mining has agreed to report favorably on the bill requiring mining corporations to post a monthly statement of receipts and expenditures, instead of a weekly statement, as heretofore.

REPRESENTATIVES of the Mountain Copper Company, Shasta, Cal., are purchasing low-grade ores to be used for flux in the furnaces at the smelter at Keswick, and several owners of ledges carrying low-grade ores have resumed operations upon their properties.

DURING 1896 the Mercur mine in Utah, according to the manager's report, handled 63,480 tons of ore and paid in dividends $225,000. The cost of mining the ore was $1.92 per ton and of milling 86 cents per ton. The ore yielded an average of $12.33 per ton.

THE Executive Committee of the California Miners' Association last Monday appointed the following a committee to take steps toward securing an appropriation from the Legislature for the Mining Bureau: S. J. Hendy, Mark B. Kerr and Samuel K. Thornton.

THE Lizalda mine, on Table mountain, in Mexico, just over the line between California and that country, has been purchased by Maston & Scott, who are negotiating for the purchase of the Sueno, and, if successful, say that they will erect a smelter at San Diego.

DURING '96 the Tacoma, Wash., smelter produced 22,584 ounces of gold, 438,504 ounces of silver, 5,012,000 pounds of lead, and 223,026 pounds of copper, of the total value of $921,994. During the same period the Everett, Wash., smelter produced in gold, silver, copper and lead $1,255,000.

ROSSLAND, B. C., a year ago had a population of less than 400, while the present number of inhabitants is estimated at 6000. Not long ago a Canadian syndicate bought several hundred lots on speculation. A better indication of the future prospects of the place could not be asked.

ASSEMBLYMAN EMMONS has introduced in the Legislature a bill limiting to seven the number of mining claims to be made by any one person or corporation or association in any one district in any one year, and to fourteen claims in one year in a county embracing more than one mining district.

WASHINGTON is in much the same position as California as to laws in regard to location of mines and there is a movement on foot there to induce the Legislature to pass laws supplementing the Federal statutes such as have been proposed in this State by the MINING AND SCIENTIFIC PRESS.

IT is being strongly contended in British Columbia that mining machinery from the United States should be admitted free of duty. It is claimed that this would cheapen the cost of working ores and result in building new smelters and mills on the ground, and consequently keep much money at home.

EVERY miner should learn to sharpen tools. It is impracticable in small mines to employ a man exclusively for this work, and it is generally impossible to take them to a blacksmith shop. Many a miner seeking work would be much more quickly employed if he could do this, and it can be learned very easily.

AT a recent meeting of the Victoria, B. C., Board of Trade a resolution was passed recommending the passage of a bill shutting out of the province all companies organized under the laws of a foreign country and imposing large fees and duties upon companies organized under the provincial or dominion acts.

A DEPOSIT of graphite, lately discovered in Ontario, promises to be one of the largest in the world. There are several deposits in California, but the quality has not been shown to be good. The demand for graphite is such that there is a constant search for new sources of supply on the part of the manufacturers who use the article.

THE Committee on Mines and Mining will probably report favorably on Assemblyman Robinson's bill, requiring mining companies working under a bond or trust to file with the County Recorder a bond of $5000 as security for the payment of laborers and materials which may be used in the development and working of those bonded mining claims.

A PETITION is being circulated, which finds many signatures, asking for the passage of a law similar to those in force in Colorado, Montana and Idaho, in which States the locator of a claim is required to do not less than ten feet of work and to find at least one wall before recording. This will prevent the practice of one prospector locating the entire country with no intention of developing his properties.

EX-GOVERNOR WEST of Utah lately accompanied some special agents of the Treasury to Rossland, B. C., as an ore expert. He says that the sampling works will be re-established at Northport when the new administration goes into power. Secretary Carlisle has refused so far to expend the money appropriated for this purpose. As it is now, the Government must accept the assays of the smelting companies.

AT Aspen, Colorado, the Cowenhagen Tunnel Company has transferred its property to a new corporation, which is formed to build a line of railway through Smuggler mountain to the town of Lenado, and thence to the Denver & Rio Grande railway. In order to carry out the railway scheme, it was necessary to use the tunnel, which will probably be the first used for a regular railway and mining and draining mines combined.

A RECENT agitation as to whether lands once deeded to the State for school purposes would revert to the Government after they were found to be mineral-bearing, led last week to a stampede to locate the school sections of the Cripple Creek district. Prospectors swarmed over the sections, setting stakes upon the State lands, and at night guards were mounted to protect the new stakes against parties holding leases from the State School Land Board.

JOHN HEIMRICH and other Salt Lake capitalists are having examinations made in the new Grand Encampment mining district in southern Wyoming. Over a very large part of the country surrounding are extensive deposits of auriferous gravel, generally shallow and of lacustrine formation. The gravel is mainly a quartz sand, carrying gold so fine that in cases it takes over 1000 nuggets to make one cent. However, it is not flaky, and may be saved in sluices.

CITING the fact that the Arkansas Valley smelter at Leadville, Colo., treated more ore by 27,000 tons in '96 than in '95, even though the great strike was on, the Pueblo, Colorado, *Chieftain* declares that the smelting business "is the best industry in the United States to-day." Still, a good many are of the idea that a paying gold mine is better, that being the only business from which is eliminated the troublesome factors of freight charges, competition and securing of sales.

THE Boston and Montana Copper Company produced from its Montana mines nearly 60,000,000 pounds of copper in 1896. The net earnings should show over $2,600,000, after all interest charges and sinking funds have been allowed. The company has spent during 1896 some $300,000 to $400,000 for permanent improvements. The management has reduced still further the cost of production, and can deliver copper in New York at a cost of 5 cents per pound, which should show a net profit of over $300,000 per month.

THE debris question is coming up in British Columbia. On the lower Fraser river there has been some agitation about running gravel in the river and filling the mouth with debris. However, although the conditions are similar, there are many who believe, as they did in California, that a very small proportion of the damage is due to hydraulic mining. The silt has been coming down for ages and has caused the formation of the great fertile basins of the lower Frazer. A case is mentioned by the *Mining Record* of a large slide from which more debris has come into the river than will be washed from the Cariboo mine in twenty years.

THE fight between the tunnel owners and mine owners is coming on apace at Cripple Creek. George B. Mechem has raised the court's ante and wants to take the whole of Gold hill with his Chicago and Cripple Creek tunnel. The Judges of the United States Circuit Court at St. Louis gave the Newman tunnel 1,500 feet on the Rico-Aspen vein by right of its location prior to the discovery of the ore at the surface. Mechem has found a presumably blind vein in his tunnel at Cripple Creek and located 7,500 feet of all kinds of veins on Gold hill because of it. The mining law gives the discoverer of a vein 1,500 feet upon it by virtue of his discovery hole and location. Mechem has located five claims on one discovery hole.

A BILL introduced in the California Legislature by Mr. Soward of Sierra has passed the Assembly and provides that owners of mining claims shall have precedence over all others in the purchase of town lots from the public domain. The bill as finally passed provides that if at any time within six months of the filing of a plat of a townsite with the County Recorder there shall remain unsurveyed into town lots any portion thereof, any person who shall discover gold in any portion of such unsurveyed portions shall by application to a Superior Judge be given the right of preferred purchasers upon the payment of an amount sufficient to survey such mineral claim. After such survey is made the preferred purchaser is entitled to a deed upon the payment of an amount equal to $1.25 per acre or fraction thereof.

THAT "time is money" is acknowledged on all sides, but seldom has it been more glowingly exemplified than in the more or less truthful telegram from Denver that H. E. Brown had been awarded $5,500,000 by the Court of Pretoria, South Africa, for one hour of his time. According to the telegram, some time in '96, the Transvaal Government announced that certain South African mineral land would be thrown open to locators, that he intended to so locate and was ready at the advertised time, but the proclamation was withdrawn, whereupon he began proceedings against the Government because of such action on its part, which is now alleged to have resulted in a verdict against the South African Republic for the amount stated. It is probable, however, that some ciphers may be dropped from the announced figures without detriment to the truth.

IT is proposed to advocate the passage of an act by the Legislature placing an export duty on ores from British Columbia. This action would mean practical prohibition of the smelting of British Columbia ore in Washington or any other American State. This, and several other measures looking toward prevention of commercial relations between the mining districts of Western Canada and the United States, have been proposed, not by the miners themselves, but by people who expect to gain indirectly. It is suggested by the miners that machinery be admitted free from the United States. Altogether many suggestions somewhat radical in their nature have been proposed for the consideration of the Legislature. But whether the present movements looking toward building a Chinese wall passes or not, it must be said that the present liberal laws and customs of the colony of the North have done much toward building up the mining interests of British Columbia.

THE Southern Pacific Company advertises through its general land agent, Wm. H. Mills, in the Siskiyou county papers, that to all persons having an actual, operated mine upon any odd numbered section of land within the limits of the grant to the California & Oregon Railroad Company, the land actually within the mining claim will be relinquished if the land is not patented, and will be donated if the land is patented. Persons wishing to prospect patented railroad land can enter into contract with the land agent, which will make the discovery of mineral upon land safe to the prospector. All lands which may reasonably be classified as mineral will be held for encouragement of mining, and mining operations will be given the preference of occupancy and use, unless such land possesses a value for the timber growing thereon. In such cases a timber value only will be assessed against the land and the land held for the encouragement of mining; or, if patented, will be sold at the minimum of $1.25 per acre, reserving the timber right. In conclusion, Mr. Mills says: "In the disposition of its land the Central Pacific Railroad Company will pursue the policy of encouraging the discovery of minerals and the prosecution of mining enterprises, and in no case will its title obstruct or discourage such enterprise."

The Solution and Precipitation of the Cyanide of Gold.*

NUMBER VII.

By S. B. CHRISTY, Professor of Mining and Metallurgy, University of California, Berkeley, Cal.

8. Recovery of Cyanide of Potassium from Strong Solutions by Zinc Sulphate.

As objection will be made to the cuprous method of gold precipitation when strong solutions of potassium cyanide must be used, it is necessary to consider the recovery of the cyanide from such solutions previous to the precipitation of the gold.

A careful study of the ferrous sulphate method of recovering the cyanide from strong solutions, previous to the recovery of the gold, by means of copper solutions, as suggested by Prof. de Wilde, has led me to regard it as entirely impracticable in most cases that occur in practice. I have, therefore, sought another method besides the one already set forth (by means of sulphuric acid and aeration). This I have found in the use of sulphate of zinc. I find, however, that an American patent had already been granted, October 15, 1895, to Bertram Haut of Wickenburg, Ariz., for such a method of recovery. According to the patent claim, he "precipitates the cyanide in the waste or spent liquor by adding a solution of sulphate of zinc containing some free sulphuric acid, whereby a cyanide precipitate is obtained; then drawing off the supernatent liquor; then mixing with the said precipitate a quantity of sulphuric acid more than sufficient to decompose the cyanide of zinc contained in said precipitate, then subjecting the mixture to a distilling operation."

The following statements are founded on my experiments made with a solution containing 1 per cent of free KCy and 0.1 per cent, or $603, gold per ton. When a chemical excess of sulphate of zinc is added to such a cyanide of potassium solution a white precipitate of cyanide of zinc forms, which readily settles, and may be decanted or filtered. [If alkaline sulphides are present, they may be first removed by treating the solution by means of lead sulphate.] If less than an excess of zinc sulphate is added, the precipitate separates very imperfectly from the solution and is difficult either to decant or filter. When the zinc sulphate contains a little free sulphuric acid very little gold comes down with the zinc cyanide, and when an excess of the zinc sulphate is used the precipitate separates in a manner leaving very little to be desired.

When the cyanide of zinc is acidified with sulphuric acid, and treated either, as I have already described, by pumping air through it, or distilling it, the cyanhydric acid may be very completely recovered by collecting it with caustic potash. The latter may be entirely saturated without loss by using two vessels for condensation, the first receiving the saturated and the second a weaker solution.

A certain amount of gold will usually be found in the zinc sulphate solution (as $HAuCy_2$). After crystallizing out the zinc sulphate to be used over again, the gold may be recovered from the mother liquor by precipitation with sulphurous acid and copper sulphate, as before described. The amount of gold that comes down at this point seems to depend on the amount of free acid contained in the zinc sulphate. Sometimes only traces come down; sometimes nearly half of that originally present in solution.

From the filtrate from the zinc cyanide precipitate the gold may be recovered by sulphurous acid and copper sulphate, or cuprous chloride direct, as already described.

This method of treating stronger solutions, such as 1 per cent, as would be used in treating rich gold ores, leaves very little to be desired, working on a laboratory scale. It is in every way superior to that described by Prof. de Wilde, with sulphate of iron. Still, it may be questioned whether such a method could be carried out in a mining camp. There is one serious difficulty that it would meet. When the ore solution contains ferrocyanide of potassium, as it is likely to do, a ferrocyanide of zinc forms, which is of the consistency of white lard. This substance is hard to settle, and practically impossible to filter. It is insoluble in acids, but easily soluble in alkalies or potassium cyanide. In the presence of this substance, the simple acidification of the solution, followed by the removal of the HCy, by circulating air through it and condensing in caustic potash, would probably be a more successful method of recovering the cyanide.

9. Precipitation of Aurous Cyanide by Means of Zinc Chloride.

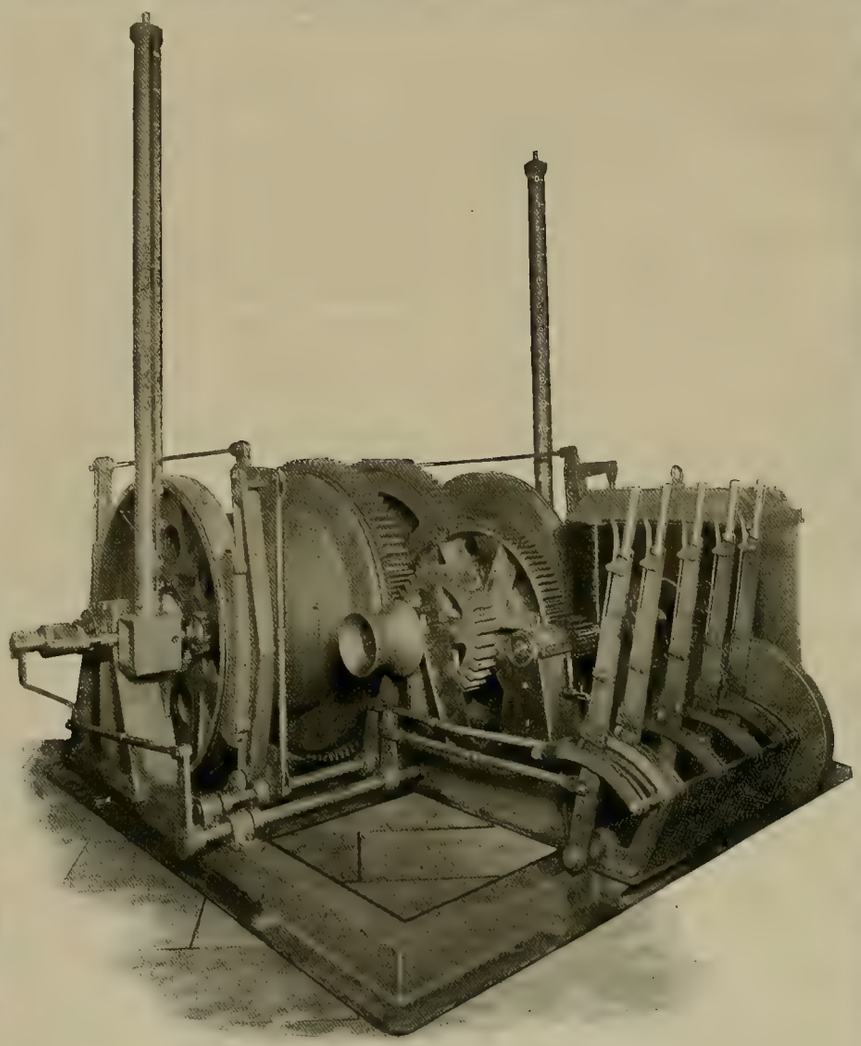
An American patent has been taken out on this method by Frederick Rinder, June 18, 1895. In this method "the solution containing gold and silver in solution is first treated by iron sulphide, whereby the silver is removed as a sulphide; chloride of zinc is then added to the filtrate, whereby the gold is precipitated as a double cyanide of zinc and gold."

I have also investigated this method. When chloride of zinc was made by boiling an excess of metallic zinc in hydrochloric acid till the action ceased, and the solution was added to one of potassium aurocyanide, nothing more than a trace of gold was precipitated. But when the chloride was formed by treating oxide of zinc with hydrochloric acid, the former in excess, so that one had in reality to do with a solution of oxychloride of zinc, 99.37 per cent of the gold present was precipitated. It should be mentioned that both solutions of chloride of zinc had a slightly acid reaction to litmus paper.

As, however, an excess of either acid or alkali dissolves the gold precipitate, this method must remain inferior to the method of precipitation as cuprous aurocyanide; for this precipitate seems almost absolutely insoluble in dilute sulphuric acid. The latter, therefore, possesses a sharpness and completeness that the zinc method can never have.

(To be Continued.)

*Colorado meeting American Institute of Mining Engineers, Sept., 1896. (Revised Proofs Dec. '96.)



DOUBLE REEL ELECTRIC MINING HOIST. (See page 89.)

THE charcoal thread used as filaments in incandescent electric lamps costs $12,000 a pound. The following is a list of the rarer metals, with their approximate prices per pound, based on the usual reduction on such quantities:

Gallium	$100,000
Beryllium and lanthanum	10,000
Rhodium and thorium	6,000
Didynium and rubidium	4,000
Indium and tantalum	3,500
Erbium, niobium and yttrium	3,000
Rhutenium and vanadium	2,000

The most expensive organic substance known is ambergris, which is worth about $600 per pound.

The Drainage of American Flat.

Written for the MINING AND SCIENTIFIC PRESS by DAN DE QUILLE.

The draining of American flat and the working of the mines situated therein is at present being seriously considered by the mining men of Virginia City and Gold Hill. The large basin-like depression known as American flat lies immediately south of the most southerly of the Gold Hill mines. It covers several hundred acres and is surrounded on all sides with hills more or less rugged. There are known to be many quartz lodes in this large basin and it has always been thought that a main branch of the Comstock lode passes through it, though not showing on the surface. It was early seen that if the Comstock kept to the range on the east side of which it is situated, and swung in and out of the curves of the hills to the northward, as at Virginia City, it must run through American flat; therefore locations were made in that section by parties who came over from California in the first rush in the spring of 1860. The usual prospect holes—round, untimbered shafts—were sunk in numerous places, and on these holdings work was done until the wonderful richness of the mines in Virginia City and Gold Hill caused a boom that enlisted all the loose capital on the Pacific coast in mining enterprises on and along the Comstock range.

When the boom came and excited men of means were wild to find a place in which to put their money, the owners of claims in American flat had no trouble in getting all the capital required for the erection of hoisting works and the purchase of first-class machinery. The big flat was then considered the most promising section off the main Comstock lode and was the scene of great activity. At this time there was quite a lively little town at the flat, called American City, a 'bus line to Virginia City and crowds of passengers daily to and fro.

But soon adverse circumstances changed the roseate hue of the American flat atmosphere to a cerulean tint. Floods of water began to be encountered, and so strong was the flow that at a depth of 500 or 600 feet nearly all were drowned out of their mines. However, a few of the stronger companies still maintained the fight. They put in more and more powerful pumping machinery and managed to sink their shafts to depths varying from 800 to 1200 feet, and one company, the Baltimore, on the edge of the flat, attained a depth of 1400 feet by a hard struggle and by stopping out some of the surface water. None of them, however, was able to do much prospecting work at points below the 600 level, and, finding at last that to handle the flow of water was like trying to drain a lake, all "threw up the sponge;" the machinery was sold, the works pulled down and the camp deserted, every company being flooded out. So these mines have ever since stood.

As the water could not be handled by pumping, nothing remained to be done but to pull up stakes and abandon the mines. Owing to the configuration of the ground below the basin, down along the course of American ravine—its outlet—it was useless to think of running a drain tunnel. To have drained the basin of the flat would have required the running of a tunnel from a point somewhere on Gold canyon between Silver City and Dayton.

What is now proposed is to extend the Sutro drain tunnel to American flat, either from the Crown Point mine or the Alta, lower Gold Hill. One of the principal mines in American flat is the Rock Island. To reach this mine from the Crown Point would call for an extension of the Sutro tunnel a distance of 8634 feet; to reach the same point from the Alta an extension of 7500 feet in length would be required. As the starting point would be at a depth of about 1400 feet below the level of the surface, the extension would tap the American flat mines at as great a depth as would a tunnel started five miles east, down by the Carson.

American flat was doubtless at one time the basin of a lake. It has a dip to the east and at the lower end there is an outlet in the shape of a big spring. The greater part of the water in the flat is probably of surface origin. It fills the basin and extends downward to a depth of 500 to 600 feet. The pro-

posed tunnel extension would come in at a much greater depth; therefore, the whole basin would be drained. Below this surface water which comes from the "scalp" of the country no more water is likely to be encountered than anywhere else along the Comstock; therefore, mining operations may be carried down far below the level of the tunnel.

In case the extension is run it will most likely be from the Alta mine. That route would cut across the stratification of the country and would be likely to find deposits of ore now unknown; besides, it is the shorter way to the flooded mines. Superintendent W. E. Sharon of leading Gold Hill mines, Colonel Boyle, superintendent of the Alta, and many other mining men and experts favor the running of the drain extension, while all business men on the Comstock wish to see such an enterprise started.

The leading mines of American flat are the Baltimore, Knickerbocker and Rock Island, with about fifty other mines and locations of more or less value, but lacking development at depth. Ore assaying as high as $80 and $100 was found in the Rock of Island, and it may be had in great quantities, as the vein is immensely wide—over 400 feet. The vein below the water level—about 600 feet—contains a great deal of iron in the shape of pyrites and seems to be inclined to run to gold. The water from the mine deposits a kind of material almost as hard as iron. This soon lines the bottom and sides of a flume to the thickness of 2 or 3 inches, thus building up a stone flume within a wooden one. The predominating metal in the Baltimore and Knickerbocker is silver, and in both were found ores running from $25 to $200 and $300 a ton. Owing to the floods of water encountered little could be done in the way of developing the streaks and bunches of ore cut into.

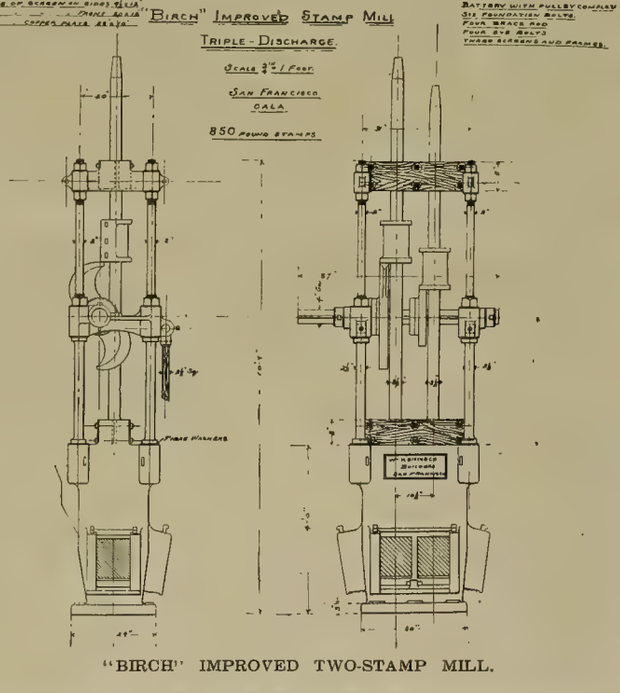
Besides the known lodes in American flat, it has always been thought that an unknown main branch of the Comstock passes through it, though not showing on the surface. Clarence King was evidently of the opinion that the main lode runs through the flat. He says: "In Seven Mile canyon, near the base of Cedar hill, is the most northern known portion of the Comstock lode. From that point it continues south in a nearly direct line, underneath Virginia City, across the divide, past Gold Hill to American flat, where the wide depressed area has produced conditions unfavorable to further development." The "unfavorable" feature he referred to was lack of drainage. From Cedar hill along the course of the lode the distance to the flat is about 22,000 feet.

Supposing the proposed drain tunnel to free the mines of American flat to the depth of no more than 1000 feet, it would still be worth while to run it. Between the surface of the earth and a depth of 1000 feet there are great possibilities. Between the surface and the 1000-foot level of the Comstock twelve bodies of ore were found and worked out, yielding 3,520,309 tons of ore of an average value of $29.65 a ton and producing $103,425,074 in bullion. The net profit in working these upper bonanzas was $22,813,280, which sum was returned to the stockholders in dividends.

(*To be Continued.*)

"Birch" Improved Two-Stamp Mill.

The cut represents a two-stamp, triple discharge mill, for gold or silver ores, made by Wm. H. Birch & Co., 129–135 First St., S. F., based on the principle of crushing a large quantity of ore economically, in the shortest space of time, with the least amount of power. The weights of stamps are 850 lbs. each, and the number of drops, 110 per minute. The weight of mortar is 2400 lbs.; screen discharge, three sides; area, 468 square inches. The shoes and dies are of forged steel. The steel cam shaft is long enough so that another mill can be added by coupling on, in order that in process of opening and developing a prospective mine an additional two-stamp mill can be added. The steel columns which support cam shaft are forged and securely keyed to mortar with fiber washers to prevent jar. The brace rods with turn-buckels to support mill are furnished. The stem guides are of oak. Stamp heads steel banded. Cam hubs steel banded. Cams have two steel keys each.



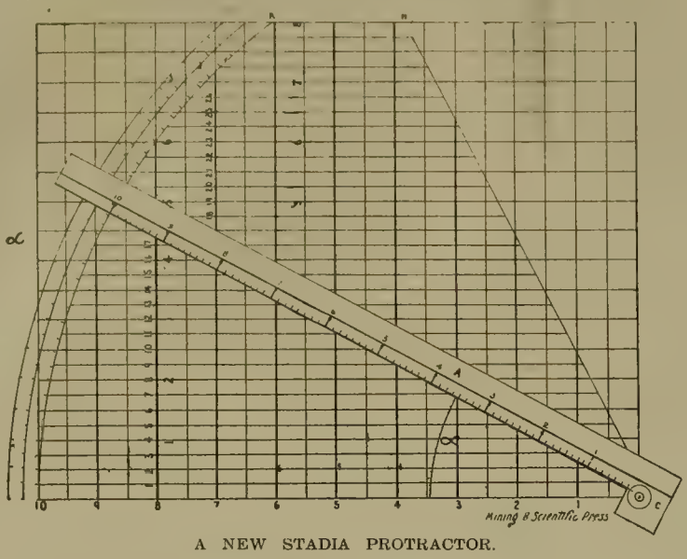
"BIRCH" IMPROVED TWO-STAMP MILL.

Suggestions for Stadia Surveying.

Written for the MINING AND SCIENTIFIC PRESS by M. A. KNAPP.

As the topography of a mining claim is often a very important point in determining its value as well as the best method of working the vein; so is it important that a map of mining ground should show those topographic features by contours, etc., as well as define the boundaries of the claims.

The notes for this data will generally be taken by the engineer by use of transit and stadia rod while making the survey of the claim lines; as plane table surveys require too much time in the field. Also, it is generally necessary to have the boundaries and monuments of the claim carefully plotted before making the contour maps, as the stadia notes are tied to the claim corners and other monuments located by more careful survey.



A NEW STADIA PROTRACTOR.

To plot these stadia notes, giving position and elevation of all points sighted to, stadia tables may be used, reducing the field readings to horizontal and vertical distances. To save time, however, two ruled paper scales may be procured on which stadia equivalents for the distances and vertical angles read in the field may be found by following the proper degree and 10-foot lines to their intersection and interpolating for the minute of angle and unit figures of the distance.

A New Stadia Protractor.—The writer uses for this work a paper scale which can be read much more rapidly and fully as accurately as these intersection scales, and thinking it might be of use to fellow mining engineers, directions for making one are here given. The work can be done in a day's time by a good draughtsman. The accompanying sketch explains itself: Scale *A* is made of folded cross-section paper and marked to 1000 feet. The center at *C* is made by fastening a small metal-foil star to a circle of cardboard and punching a pinhole through. Glue to paper exactly on center *C*. A similar center is fastened on the sheet below. When in use drive a pin through the centers into the draughting table beneath. The sheet of cross-section paper, 20x16 inches, should be of the same print as the one from which the scale was cut. Arc No. 1 of 20-inch radius is marked to degrees and half-degrees so that cosine ∞ = cosine square of the angle as marked on the scale. With this arc is used a horizontal scale on the cross-section lines in which 1000=20 inches. This is marked by horizontal rows of figures every inch vertically; the hundreds and tens marked and lines overruled; interpolating in reading for units.

On arc 3 mark degrees and quarter-degrees so that ¼-sine ∞ = sine × cosine of the degree of the angle marked on the scale. This is multiplied by 4 in order to attain greater accuracy in reading vertical distances. With this there is a vertical scale carried through the paper in which 1 inch = 20 feet, marked to 2 feet, and interpolated to ½ foot. Figures should be in vertical rows every inch horizontally, and horizontal lines overruled every ½ inch.

No. 2 arc is marked in true degrees and 10-minute angles, and a vertical scale equal to the horizontal one is marked on the sheet to correspond with this arc.

These three sets of scales should be in three different colored inks. The functions cosine square and sine × cosine are taken from stadia tables.

If now we have a stadia reading 510 feet at vertical angle—11½°—set the scale to the angle 11½° on the No. 1 arc and the 510-foot point on the scale *A* reads the corrected horizontal distance on the horizontal scale on the sheet. Then set the scale *A* on the 11½° angle on No. 3 arc, and the 510-foot point marks the true vertical distance on the vertical scale.

These readings are mentally corrected by the small correction due to the focal length of the transit. No. 2 scale is used to reduce check readings taken at high angles by causing the rodman to move the rod slowly back and forth in a vertical plane which passes through the instrument, the engineer taking the largest stadia reading on the rod. This is of course reduced to true distance by the direct angle.

Two or three stadia readings can be reduced per minute by the use of this scale, and it is so simple in construction that no large mistakes of reading are liable to occur. The errors of reading are very slight, being about one-tenth to one-quarter the errors of the reading of the transit notes. It is useless to reduce the office errors very far below those of the field.

With the use of such a quick-reading scale, stadia notes can be very readily reduced, and the contour lines and general topographical features of a mining claim quickly and closely plotted, giving a surface map that will always be of value to the mine management in connection with the later surveys of underground work, as well as of special assistance in locating ditch and road lines, etc.

A more durable scale than the one above described is made of a 2-inch strip of cardboard, 22 inches long. A strip of white paper is glued to the under side and on the ½-inch projecting edge the 1000-foot scale= 20 inches, is marked. This must be accurately marked throughout to correspond with the cross-section paper.

Telemeter-Stadia Rod.—It is unfortunate that the stadia rod, while giving results quite close enough for topographical notes, cannot be relied upon for measuring claim lines; as the errors, under unfavorable circumstances, may be as great as ½ per cent or more. The writer wishes to suggest a simple and fairly accurate method of measuring distances on rough ground by a development of the telemeter method:

Make a stadia rod 11 feet long, with targets at ½-foot and 10½ feet, accurately set and firmly fixed in place on the rod. At 5½ feet on the back of the rod fasten the top of a light compass ball and socket tripod, fixed so that the tripod can be folded back of the rod, or extended and set over a point, so as to hold the rod horizontally with the face to the instrument. A level should be attached to the side of the rod and a small cross-sight fixed on center, so that the rodman can sight back to the instrument.

This rod can be used as the ordinary stadia rod; and on all measurements of claim lines, or stadia turning points, can be set over the point and used as a telemeter. In this case we have a 10-foot perpendicular base line; and by taking ten or more multiple readings of this small angle, and averaging the error, it is possible to get it with great accuracy.

A table of functions of one-half of these small angles, to the second, could then be used and the true slope distance read; corrected afterward for vertical angle. A screw thread might be used on the vernier of the upper plate, which would give the reading of distance directly when a 10-foot base line was used. This would obviate the necessity of use of a table except to reduce the slope reading to horizontal and vertical distances.

The chief advantage of the method is in the fact that in cases where great accuracy is required, time may be taken to repeat the multiple readings a number of times, and reduce the error to less than that of the most careful chaining. The expense of surface mining surveys would be greatly reduced by use of this method.

Oakland, Cal., Jan. 23, '97.

Mining Summary.

CALIFORNIA.

Amador.

(Special Correspondence).—At Pine Grove a promising ledge of gold-bearing quartz has been reached on the claim of Thomas Day & Son, on Grass Valley creek, by a tunnel 200 feet in length.

In the Reward mine, on Grass Valley creek, a new tunnel to crosscut a very wide ledge has been begun.

A good strike of rich rock is reported from the Wieland mine.

The 10-stamp mill of the Azalea Company started last week and thus far operates quite satisfactorily. Some good rock is being taken from the old Dane ledge by the Azalea Co.

It is reported that a 20-stamp mill will soon be completed on the Robinson mine near Volcano.

Pine Grove, Jan. 23, '97.

Republican: It is expected that the Argonaut, Bellwether and Anita mining companies will each erect a mill during the present year of no fewer than forty stamps for each mine, and possibly this number may be increased to sixty.

Record: The Union Consolidated is taking out rich ore from the Union ledge on the east and west level. The breast is from 14 to 20 feet wide. The incline is going down at the rate of 30 to 40 feet per month with machine drills, having reached a depth of 480 feet, and when the 500 point is reached drifting on the Union ledge will go ahead and a crosscut pushed to the Gouge ledge.

Superintendent Dillon of the Dennis Kelly mine, in Pioneer district, has completed a deal for the purchase of the Robinson mine, near Volcano, and will have charge of it for the buyers.

At the Black Prince mine, in the shaft being sunk, they already have a good-sized vein of $6 to $7 ore. Hoisting machinery is to be erected at once.

Assays of ore from the 1050 and 1200 levels of the South Eureka mine shows a yield of from $30 to $138 per ton.

Ledger: J. F. Rooney, who is operating the McMahon property, has had buildings erected and will erect a steel whim. The shaft is down 100 feet and crosscutting to the ledge will be commenced.

The mill test recently made on the Good Hope mine was very satisfactory, and sinking will be resumed as soon as material can be gotten on the ground.

Calaveras.

Chronicle: At the Hexter mine the tunnel has reached a distance of nearly 1500 feet, and is being driven ahead as fast as possible.

Citizen: Kilburn and Coleman, mining men of Seattle are negotiating for John Howard's Poverty quartz mine in Salt Spring valley.

Frank Baumhogger of Angels is developing the Great Western. A good vein of ore is in sight which increases both in width and character as development increases.

The Carley brothers have resumed operations on their mines at French Gulch and are running the 5-stamp mill.

Some rich rock has been discovered in the Tryon mine, south of Angels.

El Dorado.

(Special Correspondence).—O. W. Frost and others, who recently purchased the Skinner mine, one-half mile from town, have incorporated. They are driving a tunnel into the famous old hill that has yielded many thousand dollars from its surface seams and pockets. The property will be known as the Empress Josephine mine.

F. B. Lloyd has completed a steam power plant on the property recently purchased from Noyes and French, by which he will drive machine drills on the tunnel work.

The Omo mine, twenty-five miles southeast of Placerville, started a 5-stamp mill last week.

Mulky and Spreckels, in the Fairplay district, twenty-seven miles east of here, have started their hydraulic plant working day and night.

D. H. Jackson and son are running tunnel and shaft work on the Lone Star and Secora properties, four miles southwest of town.

The Vavozza brothers have reached 1600 feet in their tunnel, three miles east of town. They expect to reach the channel within 200 additional feet of work. They have 400 acres in the property on which they are operating.

Col. Cummings is operating a core drill on the old Texas Hill gravel property, two and one-half miles south of town. Rooney and Fair are interested in the work.

The Selby Mining Company will sink a shaft 200 feet on the property recently bonded from the Larkin family, three and one-half miles south of town.

The article in last week's MINING AND SCIENTIFIC PRESS, "Why Mines Offered Are Not Sold," strikes a responsive chord and meets with approval among those striving to advance the mining interests of this county.

The outlook for the development of mining properties on this section of the mother lode never appeared so bright and encouraging as at present.

Brad Barnar and R. W. Dron of Glasgow, Scotland, are operating on the Potter property, one mile north of Kelsey. They bonded the claim from Rinaldo Fillipini, the merchant prince and cattle king of Garden valley.

Kohn, Kimball, and B. D. Pyke of San Francisco, locally known as the Big Three, have struck a rich channel pay streak in the Negro Hill section, three miles north of town.

Placerville, Jan. 25, '97.

E. W. and W. S. Chapman have put in a new 50-horse power, double electric hoist at their Zantgraf mine. The shaft at the mine is now down over 500 feet from the surface, or about 200 feet below the old tunnel. Sixty men are employed at the mine.

Inyo.

Register: Mr. Moore of Chicago has purchased a group of mines from Mr. Adler, on Blind Spring hill, and is running a tunnel to tap the ledge.

The Lane mine is looking well, the ore in the shaft being high grade.

The working force at the Snow's Canyon mine has been reduced, Mr. Garlick having enough ore out to make a test run of the cyanide plant.

Mariposa.

Gazette: R. D. Harper of San Francisco has bonded the Sierra Rica and Pedro Gosa mines on Bear creek from Kerrins and Bogan. Work on the property is to be commenced as soon as lumber can be hauled in. These mines have been good producers but have lain idle for a number of years, the last work having been done in 1878 by Kerrins and Snediker.

It is reported that several mines in the Sherlocks country have been sold to Fresno parties, who are backed by Eastern capital. These parties expect to erect an electric power plant below the falls on Sherlocks creek and operate the mines by electricity.

Mono.

Bridgeport *Chronicle-Union*: At the Dunderberg the mill is doing good work and everything about the works is in good running order. The tramway is complete and runs seventeen tons of ore an hour to the mill. The mine is looking well and it is probable the company will erect a cyanide plant next spring.

Nevada.

Union: The Ragon quartz mine, near the Stanford, has been bonded to Stockton men. The ledge is a good one and in the early days rich ore was extracted. There is a small hoisting plant on the property.

The lessees of the California mine, near the Reward, will put a steam hoisting plant on the property.

Placer.

Colfax *Sentinel*: At the Sellier mine rapid progress has been made, the rock in the tunnel being soft slate. An upraise to tap gravel will be started this week. A flume has been put in and a dump and large reservoir will be constructed.

Johnson, Graber & Dwyer are putting up a Huntington mill on the old Gayetty ledge, on the Bear river slope. Their ledge shows encouraging prospects.

The first car of machinery for the new stamp mill at W. H. Pierce's quartz mine, near Colfax, has arrived.

Argus: The new mill at the Marguerite is now running night and day on high-grade ore.

The Chicago Drift Gravel Mining Company, whose property is situated on the ranches of Threlkel and Zimmerman, in Long Valley district, started their 2-stamp prospecting mill on the 5th of January.

Plumas.

National-Bulletin: At Meadow Valley Prof. Price has completed his prospecting of the Diadem mine, having taken out over 400 samples, amounting to about a ton and a half of ore. He has developed a ledge of an average width of 50 feet, having crosscut it in ten different places on the 200 and 500-foot levels.

Riverside.

San Bernardino *Independent*:. The workmen in the new shaft being sunk on the Good Hope mine, near Perris, opened up a 20-inch ledge of rich ore last week.

Los Angeles men are backing Col. Hasson in developing the Little Maggie mine, west of Perris. There is an 8-inch vein that runs high.

W. Newport of Menifee lately purchased a promising free milling mine northeast of Perris. There is said to be a ledge 50 feet in width that will run $10 or $12 a ton. A tunnel will be run into the side of the mountain, tapping the vein at a depth of 700 feet.

San Bernardino.

Independent: At Ivanpah two or three of the mines of that old silver camp are producing pay ore, most of which is shipped to the Kingman sampler. Ivanpah has in days gone by produced over $5,000,000 in silver.

Eastern capitalists are negotiating for the purchase of the old Copper World mine, lying nine miles southwest of Ivanpah. Ore from this mine is said to run as high as 60 per cent copper, with a considerable valuation in gold.

B. M. Lawrence is still operating the Stonewall mine in the Ivanpah district. This mine has been on a paying basis for fifteen years.

The Bronze Mining Company at Vanderbilt will soon start up again.

San Diego.

Ramona *Sentinel*: The water has been pumped out of the Owens mine at Julian and the mine retimbered, and now, with the 10-stamp mill, about $8000 per month in gold bullion is being taken out.

Shasta.

Free Press: The placer miners in the Pittsburg mining district are meeting with success. Two men found a small deposit of gravel on Squaw creek, and in a short time took out about $800.

Miles and Keith have over three miles of ditch and are working in a 10-foot bank of rich gravel.

Salee and McDonnell have five men employed in their long tunnel on Bully Hill. They have passed through several small ledges of free gold, but are working for a larger ledge which appears upon the surface. They are now in about 800 feet.

Hart and Lanyon are opening up the Lone Rock mine on Riley bar near the Sacramento river and have sunk a shaft 44 feet deep in which they have found a 16-inch ledge of ore assaying from $40 to $50 to the ton.

A. C. Hamilton of Virginia City, Nevada, who recently purchased the Milkmaid mine near French Gulch, will shortly begin active operations upon the property on a large scale.

The thorough development of the Niagara mine near French Gulch is being pushed forward. A shaft has been sunk upon the ledge from the O'Neal tunnel.

Sierra.

Enterprise: On the Extension tunnel two ten-hour shifts have been put on and 40 feet of tunnel were made last week. The objective point will be reached in about four months.

Mountain Messenger: The German company at Minnesota are prospecting the old Cedar mine and are doing well.

The Plumbago mine is working a large force, driving tunnels and sloping.

At the Snowdown they are driving the main tunnel for the Old Yankee channel, which paid rich in early days.

Booth, Wright & Co. are working their claim on the north fork of Kanaka creek with fair results.

Siskiyou.

Journal: T. J. Nolton has contracted with I. N. Day of Cascade Locks and Grady & McArdle of Portland to transfer to them bonds on some valuable mining ground and numerous mining claims, amounting to several hundred acres, in the big bend of the Klamath river. The purchasers are to build a flume to carry 4000 inches of water from the east fork of Indian creek to the divide on the Happy Camp mountain, where it will cover ten miles of the richest portion of this famous gold stream.

The Nannette B mine on Klamath river, below Thompson creek, will be started up in about two weeks, at which time the water from the ditch and pipe will be turned into the giants.

News: The Columbia Gold and Silver Mining Company will put a force of men to work in the Columbia mine on Baldy mountain, near Scott Bar. Their ledge averages 2 feet in width and in many places it is 3 feet wide. They have about 1000 feet of tunneling, and a 10-stamp mill run by water power.

J. S. Fore of the Last Chance mine has his new improved elevator on the ground and will have it operating in the spring. The bedrock is about 50 feet deep from the surface, but carries coarse gold.

On the Olsen mine, below Sawyers Bar, they have struck another good pay channel. This mine consists of sixty acres of high ground, with a bank of gravel 150 feet high, and the improvements consist of a ditch from Canyon creek, half a mile long, and 1000 feet of 14-inch pipe, a No. 1 giant under 250-feet pressure, and a derrick for hoisting the boulders, operated by a current wheel in the river.

Journal: G. W. Grayson, Jr., of Oakland and Harry H. Hunter of Yreka have organized a company to work the Blue Gravel mine at Greenhorn, near Yreka.

Trinity.

Journal: It is reported that the Altoona mine is now employing eighty men, which force will be increased on entering the ledge. A shaft has been sunk to the depth of 80 feet. At the 50-foot level a station was cut, from which a drift was run to cut the vein at an estimated distance of 75 feet.

On East Fork on the Ozark mine a tunnel is being run on the ledge.

At the Enterprise the company are running the mill on good rock from the Lone Jack mine.

At the North Star eight men are employed and both mine and mill are running. They are working on a 5-foot ledge of ore.

Redding *Free Press*: A rich strike was recently made in the lower level of the old Lappen mine on Thorn gulch, at Deadwood. The property is owned by Tourtelotte, Brady and Cochran. At a depth of 400 feet a ledge of free-gold ore, which is from 6 to 18 inches in width, and yields $200 per ton, was tapped in several places.

James R. Eligh, who recently purchased the Bloss & McCleary gravel mine at Trinity Center, has struck a rich lead. Recently a great slide came down the mountain and the giants were turned upon it, and when the earth washed away a channel of rich gravel was encountered.

Tuolumne.

(Special Correspondence).—I have spent the past week among the mines of Tuolumne county, and everywhere found the mines looking better than ever before. At Soulsbyville the Black Oak is running under a bond of $300,000. The ore body is now 12 feet wide. Several teams are engaged in hauling ore to Oakdale, from which point it is shipped to Selby's, and nets the mine $40 a ton. The owners state that they now have in sight, between the 700 and 800 levels, $250,000. Mr. Storms is erecting a hoist on the Junction mine, adjoining the Black Oak on the south. The Junction is the property of the Mint employes. The Wheal & Perrin has a milling of ore out and will put it through the Soulsby mill to determine the value. The vein is of a good size, and there is no longer any doubt about the mines now being developed.

The Soulsby is again in active operation, after some fifteen years' idleness. The superintendent, Mr. W. Sharwood, has placed the old hoist on the Pennsylvania shaft and rebuilt the mill of fifteen stamps. The shaft is now down 220 feet; levels are being run, and as soon as they are out 100 feet, the shaft will be continued on down. The Soulsby vein is small in width, but large in gold value. In the past history of the mine the year's average of the ore was $35 a ton.

The rapid growth and evident prosperity of Jimtown, Quartz Mountain and Stent are the earmarks of a good mining section. A Scotch syndicate has taken the Atlas, on Jackass Hill, and the Keltz, east of Columbia, and are developing the Atlas. The ore is very heavily sulphureted, and should the numerous stringers once get together, it will give them a large-sized ore body. South, the Alameda is being put in shape to make it another Rawhide. The Rawhide has just had Demarest & Fullen put a large Cornish pump in place, and can now go on down into the mine's bonanzas. Nevills Jr. is getting the Alabama into good shape. The Whiskey Hill mine is now being developed. South, the Sweany lies idle. The Dutch is doing well. It has a fine hoist and the best superintendent's residence in the county. Down in the mine the ore bodies show where the money comes from, for this mine has been developed and equipped from the ore crushed in the mine's small 10-stamp mill. The ore body at this time is 65 feet wide, while the Heslep vein, to the east, has not been crosscut to. The App has a fine plant and is said to be in good ore on the Heslep vein. The San Ysabel is about to add twenty stamps. The Fitzgerald boys have been paid $80,000 for the New Era. This section prides itself on the Jumper and Golden Rule mines.

Real estate is advancing and the county shows the benefits arising from the present activity within the mines. Capital can at this time find a variety of investments that all promise well. E. H. SCHAEFFLE.

Murphys, Cal., Jan. 25th, '97.

Jamestown *Lode*: At the Jumper mine the 20-stamp mill crushes 55 tons daily.

Fred Cook has taken a bond on 100 acres of gravel mining ground below the junction of Wood's creek and the Tuolumne river, and has associated with him in the venture capitalists of San Francisco.

The Equitable M. & M. Co. of Stockton will have a 10-stamp mill running by April 1st on the Arbona mine at Tuttletown.

Sinking has been resumed in the Andy Johnson at Chinese Camp. The ledge is 4 feet strong in the bottom and the rock continues to show free gold in paying quantities.

Union-Democrat: The Black Oak mine, recently sold to Belgium capitalists, will be worked by its new owners on a large scale with the opening of spring, and will be equipped with improved machinery.

A concrete foundation for a 20-stamp mill is being laid for the Santa Ysabel.

Water is being hoisted from the Dutch mine to enable sinking on the vein to continue.

Negotiations are being carried to sell a dozen mines in the vicinity of Jackass hill, on the East lode, to an English company.

The Dead Horse mine, at Summersville, still continues a steady producer.

The Andy Johnson mine, at Chinese Camp, is being operated by half a dozen men.

Arrangements are being made for recommencing operations on the Garfield-Virginia mine, south of the Buchanan.

The Modoc mine, near the Buchanan, will shortly be equipped with a pump, to enable a closer examination of the property.

Independent: The Alameda mine is working a large force of men and building is going on rapidly.

The Draper mine at Soulsbyville is about cleaned out and sinking will shortly be resumed.

NEVADA.

A new ore body has been uncovered on the property of the Golden Eagle Mining Company in Humboldt county. The ore shows a valuation of from $50 to $100 in gold per ton. The company has just obtained a survey of its property, which embraces about twenty claims. As soon as the new working tunnel is completed the board of directors will meet to arrange for a mill. The ores are now being blocked out with a force of thirteen men.

On the Ophir group, the development of which is being promoted by the same gentlemen with few exceptions, the tunnel is being driven to cut the vein at a depth of 100 feet.

The owners of the Black Bird, which, has been productive of some very high-grade ore in the past, have patched up peace, and work has been resumed.

Pioche *Record*: At the Magnolia mine at De Lamar the new tunnel to tap the old works was run on a contract a distance of 850 feet to obtain air and connect with the old workings. A raise was made of 28 feet after the ledge was encountered. From the striking of the ledge in the new tunnel they have driven ahead 50 feet, all in good ore, and have not yet encountered the other wall. As yet no stoping has been done, the intention of the company being to block out the ore bodies and ascertain the full extent of the find.

Winnemucca *Silver State*: At Kennedy, J. A. Blossom is working ten men developing the Gold Note mine and taking out high-grade ore.

H. F. Bender is working four or five men on good ore.

Charles Kennedy is running the No. 5 tunnel in the Imperial mine, opening a ledge of sulphide ore that assays well.

Abel & Alexander have secured the old Coyote mine, and have purchased a 5-stamp mill, which they will erect.

Kyle & Houston are running a deep tunnel on the Key West mine.

White Pine *News*: The new strike in Granite district, Stepteo valley, is attracting much attention.

At Cherry creek the North Mountain Co. have decided to erect, in the early spring, three rolls with a large crushing capacity.

The Star & Grey Eagle Co. are pushing forward their work with two shifts of men, and will soon be ready for the machinery.

Walker Lake *Bulletin*: Twenty-one tons of Oneida ore, worked at the Hawthorne mill this week, produced a bar of bullion worth $2500.

OREGON.

Grant's Pass *Journal*: A movement is on foot looking toward erecting a smelting plant, or the application of some other process of treating sulphurets and ores of this district.

Times: H. A. Shorey and associates are operating the Lance property in Foots Creek

district (which they bonded for $30,000) on a larger scale than ever. They recently made the first payment of $2500.

The Black Channel Mining Co. of Foots creek is employing a good force of men, and recently contracted for 500 feet of 15-inch pipe.

Mansfield Bros. have purchased a claim near the Jewett mine, and are sinking a shaft to develop it.

Operations have been resumed at the Squaw Lake Mining Co.'s mines.

Baker City *Democrat*: At Virtue a one-half interest in the Uncle Dan mine in Quartz gulch has been purchased by a Mr. Vincent, who intends prosecuting development work.

The engine bed for the new engine at the Virtue is about completed.

W. O. Reynolds of the Flagstaff Mining Company has purchased in San Francisco machinery for the proposed mill to be erected at once on the Flagstaff mine.

WASHINGTON.

Spokesman-Review: In the Yakh district the Gold Flint management are driving their 400-foot tunnel as rapidly as possible and are in 170 feet. They expect to tap the lead May 1.

A fine body of ore has been struck on the Good Hope. The ledge is being crosscut, but the footwall has not been struck at a distance of 25 feet.

It is expected that work on the Jim Hill, owned by Judge Fleming of Texas and Senator West of Illinois, will commence about February 1.

BRITISH COLUMBIA.

The Victoria Board of Trade has proposed the following regulations as to mining corporations for the consideration of the Legislature:

"1. No companies to be registered to do business in this province except those organized under British or Canadian acts.

"2. The following scale of fees to be charged by the government on all mining companies incorporated:

Capital up to	*Fees to be Imposed.*
$100,000	$25
200,000	100
300,000	200
400,000	300
500,000	500
600,000	600
700,000	700
800,000	800
900,000	900
1,000,000	1,000

"3. Not less than one-third of capital to be set apart for 'working capital,' and which shall not be sold for less than par value.

"4. Careful revision and consolidation of the 'companies acts,' particularly as applying to the organization of mining companies.

"5. If at all possible, to prevent the repetition of the names of claims.

"7. The provincial government to require from all mining companies incorporated in British Columbia or registered under the companies acts 'foreign' an annual or semi-annual statement, should be published in pamphlet form, so that investors at home and abroad would be able to judge of the position of their investments. The statement should be in tabulated form, not too much in detail, but giving the most salient points, after the style of the Dominion banking returns: Authorized capital, treasury shares each, sold; treasury shares unsold; shipment of ore, tons; workmen; average value of ore shipped; length of time closed down; value of plant and machinery.

"8. That no shares (other than treasury) to be permitted to be issued until after a certain percentage (if only five per cent) of the treasury stock has been sold, and the money in the hands of the company."

Spokesman-Review: The Jumbo has made its first shipment of ore: two cars were loaded and sent forward. The ore comes from the maine sleighs.

The Sultana claim, on Lookout mountain, has been sold for $10,000 down, the remainder in thirty days. General Warren and a Manitoba syndicate are the buyers.

Hon. T. M. Daly, ex-minister of the interior of Cadada, with W. A. McDonald and A. Kelly of Brandon, Manitoba, have bought a half interest in the Golden Crown, in the Wellington camp, Boundary creek district, for $15,000, and have bonded the Calumet, in the same district, for $18,000.

Spokane *Chronicle*: A one-fourth interest in the Morning and Evening mines has passed from E. E. Alexander into the control of A. D. Coplen. Peter Steep has also sold his one-eighth interest to Milton Bentley.

The Gooderham syndicate, which purchased the War Eagle, will undoubtedly expend a vast amount of money in improvements in the Trail Creek district during the coming year. An agent of theirs has secured an option on a parcel of land and a water power on the river front in the southern part of the town of Trail. This fact gives some force to the statement that the Gooderhams will erect a smelter at Trail this spring.

The Sultana on Lookout mountain has been sold to Chas. S. Warren, D. W. Higgins, Governor McIntosh and Senator Kerchoffer of Manitoba. The purchase price was $10,000.

UTAH.

Salt Lake *Tribune:* The California group, consisting of fifteen claims in Camp Floyd mining district, has been secured on a lease and bond by Walker Bros. of this city, and active development is already commenced through a shaft on the Oregon claim.

Work has been resumed on the Badger group, between Mercur and Sunshine.

At Park City in the Daly-West, although the output at present is limited, the blocking-out of the ore bodies was going forward steadily. Mr. Daly says that the Peck concentrating plant through which the company will find a market for its low-grade ores will be erected.

In the Valeo it is expected that the ore body will be reached through the main tunnel in the next 50 feet, or at a distance of 325 feet from the mouth.

At the Lucky Bill the management is still drifting from the 1000-foot level. Ore showing as much as $16 in gold per ton is being encountered at intervals.

In the Primrose development is progressing steadily while ore is being taken out of a streak that varies from 10 to 18 inches.

In the Grand Central at Tintic early in January the drift on the 700-foot level, at a distance of 590 feet from the station, broke into the long-sought chute of ore. Since then the ore has been driven into for a distance of 40 feet, with a breast 5x7 feet. The metals occur in a gangue indentical with that existing at the Centennial Eureka and shows not only a high percentage of copper, but free gold. The exploitation of its ground was commenced nearly two years ago by the Grand Central Company and since that time about $115,000 has been expended.

In the West Dip at Mercur in all of the discoveries made the ore dips to the west and gets flatter as it goes, so that there is good reason for the belief that the ore is continuous through the whole valley, and close to the surface.

Bingham *Bulletin*: The Highland Boy Company are moving in the matter of erecting their mill, but it is probable actual work will not begin until spring opens.

Parties were here yesterday from New York viewing the result of recent operations at the Bingham tunnel, and it is understood that the great enterprise is to be pushed to completion at as early a date as possible.

The Red Wing, in its lower tunnel, McCarrick lease, this week tapped a good body of rich ore.

A twenty-five ton shipment of concentrates has just been made from the Last Chance mill.

Ore is moving from Bingham station at the rate of about five carloads daily.

The ore coming from the Old Jordan & Galena Company's mines this month is averaging between fifty and sixty tons daily, and may reach 1800 tons.

Shipments from the Old Telegraph this month have been lighter than for some time previous, and do not exceed twenty-five carloads.

Park *Patriot*: On a low estimate the value of the ore blocked out in the Daly-West is not less than $3,500,000 at the market values. If the much-talked-of new concentrator, a portion of which is built, should be finished, the Daly-West would be in condition to double its present force.

The mineralized rock through which the winze in the Ontario shaft No. 2 from the 1500-foot level is being sent down to the 1700-foot level this week is better than that through which it was passed last week. Twenty-four cars of first-class ore are being taken daily out of the winze, which is 140 feet below the 1500-foot level.

Tintic *Miner*: Salt Lake and Eastern parties have secured a lease and bond on the Fairview group lying on Mammoth hill. The bond runs for twenty months and the consideration is $75,000.

Options have been secured by local parties on several promising properties north of Eureka near the Rising Sun, and there promises to be a considerable movement there during the coming spring.

Mercur *Mercury*: The Brickyard has so much ore blocked out that they cannot do much more work to advantage until the new mill is erected. Most of the men have been laid off for a while.

The new working shaft in the La Cigale is commenced, and ore of good value can be obtained from the ground down.

IDAHO.

Spokesman-Review: Word came from Wallace that in the Treasure Vault fine bodies of ore have been uncovered. Work is being done through three tunnels, with ore in each. It is one of the few properties in the Cœur d'Alenes that shows peacock ores in any amount.

The Continental is showing a little ore in its upper tunnel, where 100 feet farther is expected to run into the heart of the chute. Its ore is peculiar, running silver in form of chloride, bromide and galena, lead in galena, chloride and crystals, copper and gold.

Mullan will add at least one to the list of producing mines of the Cœur d'Alenes during 1897, arrangements having been made to put a considerable force of men at work on the Central as soon as spring opens.

Wardner *News*: Manager McDonald of the Frisco mine, at Gem, has discharged about 100 of the miners. About 70 have been retained to do development work. The shaft will be sunk to a depth of 800 feet. When this development work is completed the mine will be in a better condition than ever before for handling the immense output which this property is capable of producing. A new Corliss engine has been ordered.

The Consolidated Tiger-Poorman will resume operations in a few weeks—possibly within one week. The water is out down below the 1000-foot level, and miners are already at work on that level. Over $125,000 has been expended in new buildings and machinery during the past year. The new concentrating plant has a treating capacity of 500 tons of ore, and is automatic all the way through.

MONTANA.

Butte *Inter-Mountain:* The semi-annual statement of the United Smelting and Refining Company of Jersey City, N. J., and Helena, shows that the plant of the company at East Helena and realty represents a cash value of $500,000, while ore and other personal property belonging to it are valued at $530,000. The liabilities of the company are $492,000. They are preparing another blast furnace and other improvements are being made. When the Missouri River Power Company completes its dam at Canyon Ferry, and is prepared to deliver electrical power, the company will introduce electricity into its works at East Helena.

Mining World: Sinking has been resumed at the Original at the bottom of the shaft, which is 800 feet deep, and will be continued at least to the 1000-foot level, where drifts will be run and ore stoped out. The shaft will later be sunk to greater depth. There is no question of ore bodies in this property, as the same lead runs through it as the one the Gagnon has worked for years to a depth of about 1500 feet.

WYOMING.

Denver *Republican*: The Grand Encampment mining district is commencing to attract outside capital, and within the last few weeks a number of transfers have been made. Ed Dickinson, general manager of the Union Pacific system, Thos. Sun, one of the best known stockmen in Wyoming, M. W. Dillon and others have located 4000 acres of placer land in the district, and have secured all of the unappropriated water in the north and south forks of the Grand Encampment creek. These placers are rich with coarse, heavy gold. A number of the business men of Rawlins are agitating the question of putting up a smelter for the reduction of these ores.

SOUTH DAKOTA.

Black Hills *Times*: The transfer of the Star group, of eight locations, between Spearfish and Iron creeks, for a consideration of $60,000, to R. H. Lilly, reported to represent the Horseshoe Mining Company, gives some idea of the rapid increase in the value of mining claims in the new camp.

Developments in Ragged Top camp have resulted in the finding of the same grade and character of ore in nearly every section of the Black Hills. The latest discoveries have been made in Carbonate camp, on Phœnix gulch, where Sol Jefferson has unearthed boulders which assay $30 per ton. In the same gulch, on the Blue Bird group of claims, owned by Wendel Koerner, the same character of float is found, which assays from $12 to $16 per ton. On the Geyser group, owned by W. D. Johnson and J. Goldberg, similar boulders are in evidence on the surface carrying from $12 per ton up. This rock, apparently a limestone, has lain unnoticed for years, and would have remained so if it were not for the discoveries made in Ragged Top.

The Calamity group, on the southwest slope of Ragged Top mountain, have been sold, together with the Banquillo lodes Nos. 3 and 4, to Eastern parties by the original locators, Mosher and Goodman.

The Dacey shaft in Ragged Top camp is 195 feet deep, the bottom being in yellow sand and bunches of ore.

The Union Hill M. Co. have their diamond drill in place at the bottom of the 320-foot shaft on their Union Hill group. A 200-foot hole will be sunk and a core of the material passed through be secured, when the drill will be removed to the Hoodoo tunnel, now in 425 feet. Horizontal bores will be driven, crosscutting the formation. Both tunnel and shaft are now in a good grade of ore and apparently the same body, though several hundred feet of virgin ground intervenes between. Supt. Grable is attending a meeting of the company, at which a contract for the erection of the new 200-stamp mill will be awarded. The company will build a railroad connecting their various mines with the mill and smelter, and electricity will be used as the motive power.

The old Hawkeye will retain its organization and absorb the property of the Pluma Company. The matter will be arranged in a few weeks, and as soon as it is perfected a large force of men will be put at work in the mines and the mills started.

The deal for the Sunset and Rainy Day lodes has been closed and the first payment made to the owners, Fish and Hopkins. D. C. Boley, the purchaser, will at once commence development work.

The new 500-horse power Corliss cross-compound engine at the Homestake old "80" mill has been started up. One hundred of the 200 stamps in the remodeled mill are dropping.

COLORADO.

The Black Wonder Company at Lake City, Colo., is putting in a gas engine and blower at the mine to furnish air to the lower workings which are at a depth of 636 feet. This company has a lixiviation plant at the mine which will be started to operating within a month.

At Cripple Creek at the Gold Queen, on Galena hill, a shaft down 65 feet discloses 4 feet of ore that assays from $20 to $32 a ton. A new steam plant has been ordered.

The Cripple Creek sampler has been purchased by a syndicate of mine owners, composed of Reed & McKinnie, Cobb & Wilson and Beiakadish. Possession will be given by Tutt & Penrose on March 1st.

The occurrence of galena in regular seam in the feeders now being cut in the Pointer is interesting. There appears to be a small zone stretching northwest from the Pointer toward Cripple Creek town, in which the principal values are in silver.

The St. Thomas, on Beacon hill, has been taken under $35,000 bonds and lease by a new company organized by Timis & Clapp.

The Cripple Creek district will have work for all the new mills now planned, and if the mines continue to turn out low grade ores as at present, there will be others needed soon. It has become a serious question with the mines where to dispose of their products. Every mill that treats the district ores is crowded beyond its capacity, with bins overflowing and sidetracks filled with unloaded cars. The present milling capacity of the camp is about 540 tons a day, and the mills under contemplation will add about 500 tons a day to the capacity. Inside of sixty days the cyanide mill at Florence will have increased the capacity of its plant 160 tons a day by the completion of the new roasting apparatus.

At Victor the Anglo-Colorado Exploration Syndicate will cut its group of 17 acres of Battle mountain into blocks and lease the entire ground, including the Rigi. The new shaft on the Rigi has produced 350 tons of ore in the past two months from development work alone.

A 12-foot vein, which gives average mill returns of $36, has been opened up at a depth of 78 feet in the Alpha property, on Beacon hill. The claim is under bond and lease to William Mendel of Cripple Creek.

The third installment of Elkton stock, amounting to 50,000 shares, and a portion of a block of 300,000 shares, secured under option last August by a French syndicate, has been accepted on behalf of the foreigners. The price agreed upon was $1 a share. By clearing the 50,000 shares, the Frenchmen have now absorbed 200,000 of the 300,000 shares on which they hold an option. The remaining 100,000 shares must be taken up at the rate of 50,000 shares or more per month.

Near Georgetown the Allunde Consolidated Mining Company, which now owns the properties of the Colorado Central Consolidated Mining Company, the Equator Mining and Smelting Company and John Turck, keeps employed from 65 to 70 men, and a vast amount of dead work has been done since January, 1896, repairing and retimbering workings that had gone to decay from disuse caused by contention in the courts. These different properties have produced about $5,000,000. The Colorado Central alone has paid during its lifetime $530,000 in dividends.

The Doric Gold Mines (Limited) is an English enterprise and has erected one of the finest air-compressor plants and buildings in the State. They own 28 claims on Saxon mountain, and also lease and bond on eight other claims. They are driving an 8x8-foot cross-cut tunnel to develop their claims. In the first 500 feet they have encountered three of the lodes, each in fair ore, and shortly intend to drift on them.

The Dunderberg mine, at Brownville, has been steadily developed for the past year or more with a force of 74 miners, and has been making regular shipments.

At Telluride, E. J. Field, general manager of an Eastern company, which has an option on Pinch Bros.' group of gold properties, the Nellie mine, and Closett & Stansbeck's property, the Star Grazer, is having development work pushed as rapidly as possible. The Stella tunnel is being driven ahead with three shifts of men and is in a distance of 350 feet on the vein.

A party of experts have been making an examination of the Silver Pick group of properties, on Mt. Wilson, the past several days, for English capitalists.

One of the most important mining deals recently consummated is the consolidation of the Cheesman and Joe Hill tunnel interests on Battle mountain, Red Cliff mining district, and the formation of the Eagle River Mining and Tunneling Company, with a capital of $3,000,000. The consolidation puts the new company in possession of a very large area of mineral ground on Battle mountain. The plans and surveys have been made for the construction of a two-track tunnel, 9x9 feet in the clear and 3000 feet long.

ARIZONA.

Bisbee *Orb*: South of Crittenden, the Empire Smelting Company has purchased a tract of land from R. R Richardson, on which a townsite has been laid out and a large smelter has been built. The new town is called Rollin. The company has bought the Hardshell mine, twelve miles away, and the Flux, but two and a half miles distant, and is building roads to each.

Twenty teams are busy hauling ore from the old Holland mine near Washington camp in the Patagonian mountains.

The DuQuesne people are doing much development work and have a hoist and other machinery ample to go to the 600-foot level. So soon as a sufficient amount of work is done to justify, a smelter will be erected.

W. A. Clark of Butte, Montana, who owns the United Verde mines at Jerome, has secured the Pride of the West, a copper property of promise, and a large force of men will be put at work immediately. This claim was recently bonded for $80,000, but the sale did not go.

At Harshaw, Frank Powers is building a new concentrating mill at the World's Fair mine. The property is a silver mine and rich.

Globe *Silver Belt*: Lewisohn Bros. have seventy-five men at work in the Rosemont copper mines and expect to increase the force.

Developments in the Lost Gulch mine have opened an important ore body. A large amount of work has been done in opening the mine during the past few months and the discoveries of ore have exceeded the sanguine expectations of the management. The mill is of ten stamps, and about twenty-five tons of ore are run through daily. The force of men now employed numbers thirty.

The shaft on the Black Copper is down 230 feet and a crosscut is to be started at that depth. Work on the Dadeville goes on and the crosscut at the 75-foot level has been driven 15 feet in good ore. The ledge at that depth is supposed to be at least 20 feet through.

Eight copper claims owned by J. H. Durham, Ed S. Lyell and Jas. Flynn, near Owl Head, Pinal county, were bonded Dec. 3rd last to English capitalists for $35,000.

Prescott *Journal Miner*: At Oro Blanco the Old Glory has opened a true fissure vein with well defined walls and 8 feet of vein matter that assays $40 per ton.

A bond for twelve months has been given to Thomas Whitney, of Chicago, for the Connecticut mine, in Hassayampa district. The owners of the mine are Fred Sattes, Juan Robles, Julian Mora and Peter Omallia. The purchase price is $5000, of which $500 was paid in cash.

The company which recently purchased the Standard and Buster mines, in the Bradshaw mountains from John McKenzie, will shortly commence active operations.

Scientific Progress.

Roberts-Austen's Discovery.

Prof. Roberts-Austen's discoveries on the interdiffiusibility of metals have been taken up by the Royal Society of England. The facts have been to some extent known to savants before, but now the results are made more clear. It is shown that solid metals may be made to mix themselves as if the atoms were living creatures. Prof. Roberts-Austen has, in fact, discovered pieces of metal engaged in the very act of mixing themselves up with each other. Of course, the interest of this is that the interdiffusion had been found to take place when the metals were cold, and though this property in metals, to be capable of attaching themselves one to the other when cold, has been talked about before, nothing so clearly proved has hitherto been at the service of metallurgists and chemists as the facts adduced by Prof. Roberts-Austen. He shows that when clean surfaces of lead and gold are held together in the absence of air, at a temperature of 40° for four days, they unite firmly, and can only be separated by a force equal to one-third of the breaking strain of the lead. The professor has also proved that if a plate of gold be laid under one of lead about three-tenths of an inch thick, in three days gold will have risen and diffused itself to the top of the other metal in very appreciable quantity.

A Property of Compressed Air.

Compressed-air motors have been in successful operation in France for many years, and they are now rapidly establishing themselves in public favor in the United States. They have been constructed and tested at Rome, New York, continuously for two years, in all conditions of weather, and have given satisfaction even at temperatures below zero. Several motors are now, and have been, running for some months on the 125th-Street Railway, in the city of New York, in daily service, without having lost a trip and with great satisfaction to the public.

A remarkable property of compressed air is that its efficiency can be doubled by reheating. This is not theory; the fact has been confirmed by actual demonstration, both in Europe and America. It may appear incredible and contrary to well-known physical laws that the efficiency of air can be doubled by simply passing it through a tank of hot water before admission to the motor cylinders, but such is the fact, and the reheating which doubles the power represents a consumption of coal only one-eighth of the amount required at the power station to produce the compression.—Herman Hauph before the Franklin Institute.

EXPERIMENTS at the imperial navy yards at Wilhelmshafen have shown conclusively that aluminum cannot be used practically in men-of-war construction, while aluminum bronze has turned out satisfactorily in many cases, when the alloy contained 94–96 per cent of aluminum and 6–4 per cent copper, says *Engineering Magazine*. After investigating and testing aluminum in certain parts of vessels, the following conclusions were arrived at: Aluminum bronze is useless for bearings, valves, etc., on account of the rapid wearing away; it has been found useful, however, for various parts of machines where friction is not an important factor, and also in cases where light weight is an object. Furniture made of aluminum showed decidedly too little resistance and required frequent repainting; aluminum shows, furthermore, but little resistance to sea-water, thus making it useless for the walls of vessels. A 10 per cent aluminum bronze, however, stands a fair chance of being freely used as soon as the price of aluminum can be sufficiently reduced to approach the value of cast steel.

WARREN M. FOOTE of Philadelphia gives, in the *American Journal of Science*, an account of a meteorite which was seen at its fall by M. Bartlett of Florence, Arizona. It passed through the heavens in a southerly direction and fell with a report like that of a cannon. The new-found meteorite is a typical example of the class of siderites, weighing about 521 pounds, and about 92 inches long, 24 inches broad and 8 inches thick. Mr. Bartlett says: "It has the characteristic 'thumb' marks, and on a flat side it has two cup-shaped pits from 4 to 6 inches in diameter, which is a remarkable feature. At the point where the fragments were removed the octahedral cleavage and lines of crystallization are noticeable to a degree rarely seen in iron. It is, however, on the etched surface prepared through treating a polished slab with dilute nitric acid, in the usual manner, that the beauty of the crystalline structure is best seen.

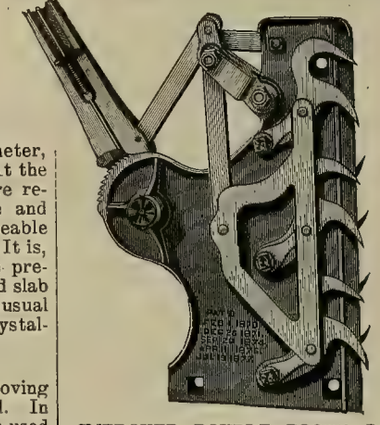


THE use of sand blast for removing old paint from iron is being tried. In one instance the sand blast was used to clean between decks of a cattle steamer, which was in an exceedingly bad condition. The results were highly satisfactory as to quality of work done, but the time consumed was excessive. The air pressure used was, however, only about ten pounds per square inch, and it is, therefore, reasonable to suppose that if, say, from forty to fifty pounds pressure has been used, the results might have been satisfactory in point of both quality and economy of work. At any rate, it would seem worth trying the process further. The promise of money saving that it holds out is certainly seductive.

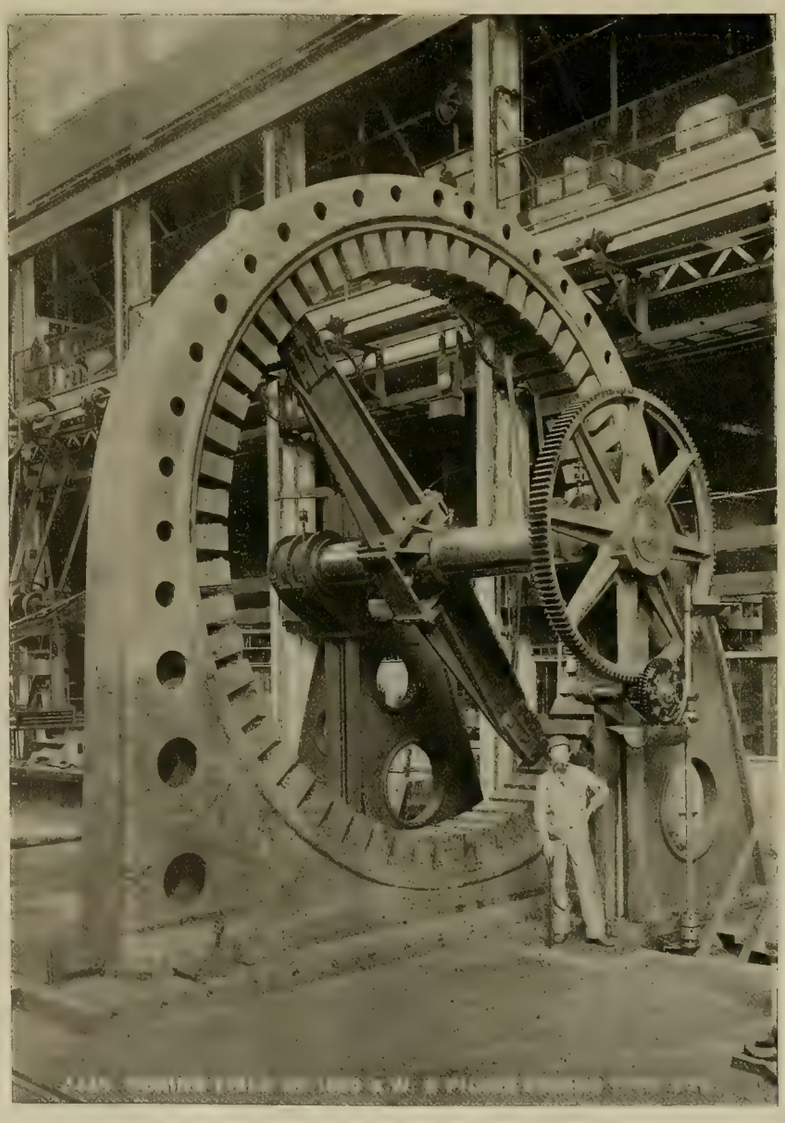
Mechanical Progress.

Improved Double Tooth "Reliance" Dog, Made Entirely of Steel.

These dogs are made both right and left hand and can be bolted to the knee or standard of any sawmill head blocks. The cut herewith represents a right-hand dog, which is made to bolt to the right-hand side of the knee, viewed from the platform of the carriage, where the setter works. This dog combines all the best features of the "Reliance" single-tooth and "Boss" double-tooth dogs, and has double-grip hook teeth, working in both directions, up and down, and all operated by one lever, made entirely of steel, and so constructed as to be used to bolt to knees of any head block, or inserted and used in a patent hollow knee. The lever has a downward movement to dog log or cant and is held firmly in position by a ratchet and stop, operated by hand piece on the end of lever, making it impossible for the teeth to work out and release the cant or log and allow it to crowd or break the saw. They are made for both high and low knees. Extreme height of high-knee dog is 26 inches and that of the low-knee dog is 18 inches; furnished by the Edw. P. Allis Co., 9 Fremont St., San Francisco.



IMPROVED DOUBLE TOOTH DOG.



LARGE GENERATOR IN COURSE OF CONSTRUCTION.

Largest Generators for Lighting.

The four largest dynamo electric machines ever constructed, to be used primarily for lighting purposes, were installed last month by the Westinghouse Electric and Manufacturing Co. at the central station of the Allegheny County Light Co. of Pittsburg, Pa. Each of these generators has an output of 1500 kilowatts (2000 H. P.). They are wound for 2400 volts and at a speed of 116 R. P. M. deliver two-phase currents at a frequency of sixty cycles per second (7200 alternations per minute)—that is to say, the direction of the current is reversed 7200 times per minute.

These generators, says the *Scientific Machinist*, are of the same general design as our standard engine-type machines and are direct connected to Westinghouse marine-type compound engines. The distinguishing feature of engine-type generators is the manner of mounting the armature. The armature is keyed to the engine shaft, and, revolving in the magnetic field, becomes the fly-wheel of the engine. The energy of the great 5000 H. P. machines installed by the Westinghouse Co. at Niagara Falls is chiefly used for general industrial purposes, such as the operation of machinery in mills and factories, the operation of street railways and electrolytic purposes. The principal use, therefore, of that plant is to supply power, while lighting is merely incidental. These generators will be used chiefly for lighting arc and incandescent lights, though a considerable amount of power for polyphase motors is provided for by the same generators and distributing circuits that supply the lights, so that they are the largest machines of their class ever constructed.

In the illustration the armature and field bobbins are not in place. This is merely a shop view showing the field casting being turned true in a lathe. The sixty-two field poles of this machine are constructed of a great number of thin sheets of steel punched into suitable form and cast into the yoke or frame. These are secured together by end plates, which are held by long rivets passing through holes provided in the plates and the sheets of steel. The height of each generator from the bottom of the bed plate to the top of the field is 22 feet 7 inches. The weight of the armature (the revolving element) is 73,925 pounds. The weight of the machine complete is 226,522 pounds. The system employed is known as the Tesla polyphase alternating current system. Each generator delivers alternating currents to each of two circuits, the currents in these circuits differing from each other in their time relation, or phase, by 90°.

THE observation made by Mr. Alfred Springer five years ago that the acoustical properties of aluminum are approximate to those of wood, has been verified by continued experiments with sound-boards of that metal, and the author exhibited in the American Association several aluminum violins, together with a device, called a bass bar, by means of which the quality of the tone produced by the instrument can be controlled.

Electrical Progress.

Electric Energy From Coal.

No means has been found for the direct determination of the solution pressure of metals, but it may be calculated from the difference in potential between a metal and a solution of one of its salts, says the *Electrical Review* of London. Methods for the determination of the latter have been devised by Ostwald, and improved by Paschen. By the use of these and other constants, which the researches of physical chemistry have placed in his hands, the physicist can now calculate the electromotive force which can be obtained by various combinations of metals and solutions. On this side the theory has rendered essentially the same service for the galvanic cell which the atomic theory rendered for chemical compounds when it furnished the means for calculating their percentage composition. As in the early days of the atomic theory, many of the constants in question are imperfectly known, but since the theory has shown clearly their independence, new means for their determination and for the control of their accuracy are constantly being discovered. Every one who is familiar with the extremely wasteful character of all processes now at our disposal for the transformation of chemical into mechanical energy, must have had the thought that there is surely some means of saving a part of the enormous loss. At present, the attention of the scientific world is turned toward the transformation of the chemical energy of coal into electrical energy as the probable solution of this problem. It seems to be almost certain that physical chemistry has already made clear the principles by means of which such a transformation may be accomplished. Indeed, Dr. W. Borchers, by the use of a solution of cuprous chloride with producer gas, or carbon monoxide on one side and air on the other, has already obtained an electrical current which corresponds to a transformation of 30 per cent of the chemical energy into electrical. This is an efficiency three times that of the best steam engines. There is no probability that this method can ever be practically useful, but that a practical method will soon be discovered is, at least, possible.

Electric Traction in the Sewers of Paris.

Ever since Victor Hugo made famous in "Les Miserables" the sewers of Paris, they have been one of the sights which venturesome visitors to that city aimed to see. It now seems that even these have been invaded by electricity. A contemporary, in describing them, says:

"The boats are used in the larger tunnels, which are some 10 feet high and 18 feet broad, with a rectangular channel in the floor forming a canal 10 feet wide and 3 feet 6 inches deep, along which the sewage flows. The smaller branches are similarly constructed, but the canal is under 4 feet wide, and cars with flanged wheels run on the edges of the channel, which act as rails. The primary object of both boats and cars is to drag scrapers for cleaning the channel—the admission of visitors being, as it were, an accidental adjunct. Both cars and boats are now propelled by electricity derived from accumulators contained in the leading vehicle, and weighing from 40 to 14 cwt. In order not to unnecessarily stir up trouble—and other things—from the liquid depths, the boats have no screws or paddles, but propel themselves by picking up a chain laid along the bottom of the sewage channel and passed over a driving pulley geared on to the motor. The train consists in busy times of six boats or cars and will accommodate as many as 100 persons."

A New Light.

Prof. O. Schutt of Jena has invented what he calls the electro-capillary light. He finds that when a discharge of an induction coil is sent through a capillary tube of about 0.05 mm. diameter, provided with aluminum or copper electrodes, and filled with air at ordinary pressures, an intense luminosity is obtained—a luminosity which is described as "intrinsically far superior to that of the arc." Wider tubes give less light.

The difficulties in the way thus far are that the light is not continuous and tubes of proper diameter for the best results deteriorate rapidly.

Practical Information.

Oldest Iron Bridge.

The idea of building iron bridges is first found, according to Ganthey, in Italian writings of the sixteenth century, and French engineers tried to act upon it in the beginning of the seventeenth. Desaguiliers planned an iron bridge over the Thames. Garrin commenced in 1719 with the construction of an iron bridge over the river Rhone at Lyons, but the difficulties and cost of the work discouraged him, and the bridge was finally built of wood. At that time only chain bridges were known, apart from wood and stone structures. Chains were strected from one bank of a river to the other, and the flooring placed directly upon them. Bridges of that kind originated probably in China. Anastasius Kircher describes in 1667 a bridge at Kin-tung, China, which was supported by twenty iron chains. The military bridges of the seventeenth and eighteenth centuries were of similar character.

It was in England where the first permanent iron bridge was built. It is the cast iron, one-span bridge over the Severn, near the famous Coalbrookdale Iron Works, in Shropshire. After this pattern many cast iron bridges were manufactured in England during the last two decades of the eighteenth century and shipped even to America.

The material for the Severn bridge was cast by the Coalbrookdale Iron Works in 1776 to 1779, and in the latter year the bridge was open for traffic. It is still in excellent preservation and is in daily use for a considerable traffic over the river Severn.

Mining at Great Depths.

B. H. Brough, in his recent lecture on "The Problems Associated With Mining at Great Depths," said that the maximum depth had reached 4900 feet at the Red Jacket shaft of the Calumet and Hecla mine, in the Lake Superior district, and the only other mine over 4000 feet was the Tamarack, in the same district, which is 4450 feet deep. Of mines over 3500 and under 4000 feet there were four in Germany, two in Belgium and one in Austria-Hungary. The deepest British mine is sixth on the world's list. It is the Pendleton, near Manchester, and is 3474 feet. The deepest in Scotland was given as the Niddrie, at Portobello, which is 2010 feet. Mr. Brough dealt with the difficulties of deep mining; and he stated that the cost of hemp ropes used to be 6d. per ton of output, but now crucible steel wire ropes were used, and in one case a flat rope weighed only 8.2 pounds per foot, had a tensile strength of 89 tons per square foot, raised loads of 11 tons from a depth of 3117 feet, and yet lasted twelve months. At the deep mines of Calumet the cage, carrying six tons, was lifted at the rate of a mile in 1½ minutes; in England the speed has been as great as 57 miles an hour, and the lecturer pointed out that the best way to increase the speed of winding was to slightly increase the steam pressure and the size of the engines. In the Marchiennes mines the shaft was small in diameter, although nearly 4000 feet deep, and 10 and 12 deck cages were used, the cage weighing 8800 pounds, and carrying 13,200 pounds; but in Kimberley mine of 1100 feet depth, 3665 tons had been taken out in 11½ hours.

RECENT experiments show conclusively that the gas consumed in one 16-candle power gas jet, if consumed in a gas engine, will produce three 16 C. P. electric lights.

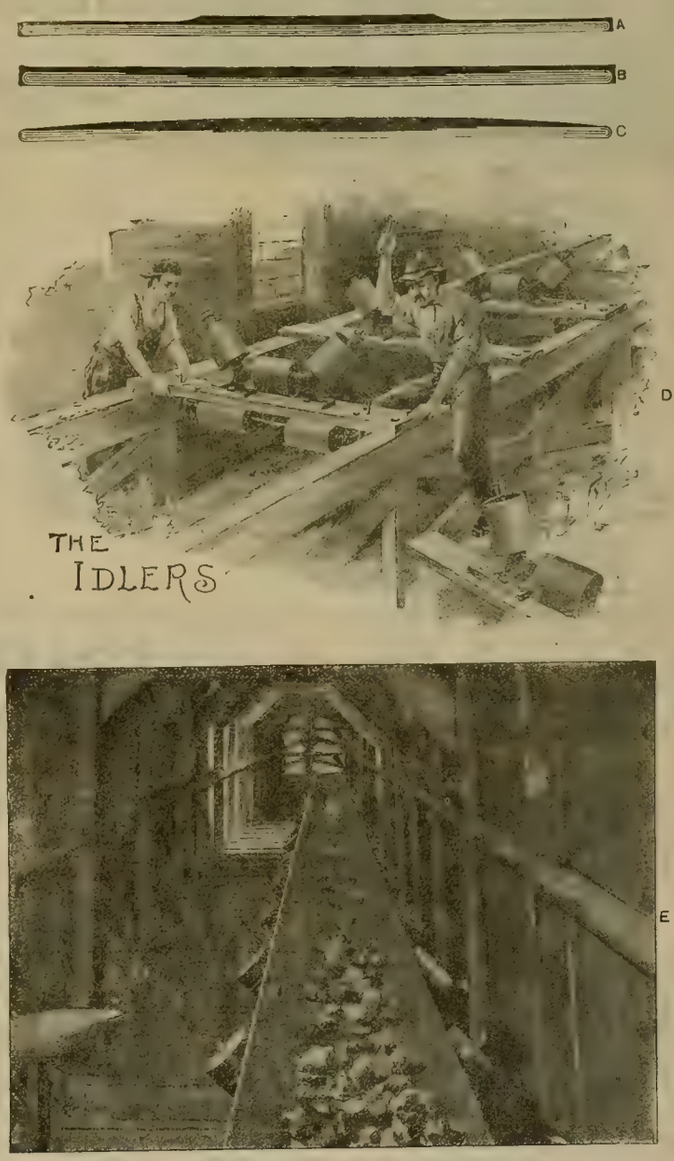
THE charter of the Bank of France expires next year, and the bank officials have been in negotiation with the Government for some time to arrange the terms upon which a renewal of the charter will be granted. The Bank of France has always been exceptionally strong, having accumulated the largest amount of currency, both gold and silver, of any of the European national banks. The charter of the bank is to be renewed and extended, under the agreement just reached, for twenty-three years, but with some changes. The limit of the note issue is raised from 4,000,000,000 to 5,000,000,000 francs—$1,000,000,000. New burdens, however, and new services are imposed. The bank is to advance to the Government 40,000,000 francs free of interest, and is to renounce interest on loans made to the Government in 1857 and 1878, aggregating 140,000,000 francs. About 7,000,000 francs of the bank's notes are supposed to have been destroyed—having been out for a long time and never presented for redemption. The bank is not to gain by this loss of the noteholders. The Government takes the 7,000,000 francs and assumes the responsibility of redeeming the notes if they are ever presented.

A STRIKING illustration of the influence of fatigue upon the nervous system is afforded by an experiment conducted by an Italian physician some months ago. Twenty-four bicycle riders who had ridden thirty-two miles in two hours and a quarter were examined with reference to their hearing, and it was in nearly every instance found to be defective. After two hours' rest the hearing had become nominal in most of them.

Rubber Belt Conveyors.

The accompanying illustrations of rubber belt conveyors is one that needs but little explanation. Its simplicity will be apparent at first glance, while its efficiency is demonstrated in the many plants where the same is now in use. The manufacture of this style of conveyors has been taken up by the Jeffrey M'f'g Company. The special rubber belt and idlers, as shown, are manufactured under the Robins patents. Illustrations *A*, *B* and *C* show three styles of rubber belt. The trouble heretofore has been to get the proper kind of material in a rubber belt which will stand the wear and tear occasioned by the material falling upon it. This has been brought to a high degree of perfection in the Robins belt. The reinforced thickness of rubber on the belt insures long life by having the carrying side strengthened where it is mostly needed. Fig. *D* shows the supporting rollers and idlers, which are very simple in construction and make the erection of this system comparatively inexpensive.

Fig. *E* is an illustration of the conveyor as it appears in operation. This rubber belt system is arranged to deliver the material at the terminals or along the line, and is especially desirable in the handling of ores, broken stones, sand, clay, fertilizers, grain, coal, etc. For catalogue and prices, address the Jeffrey M'f'g Company at Columbus, New York, Chicago, or Denver.



RUBBER BELTS AND CONVEYORS.

UNION IRON WORKS,

★ ★ 222 Market Street, San Francisco, Cal. ★ ★

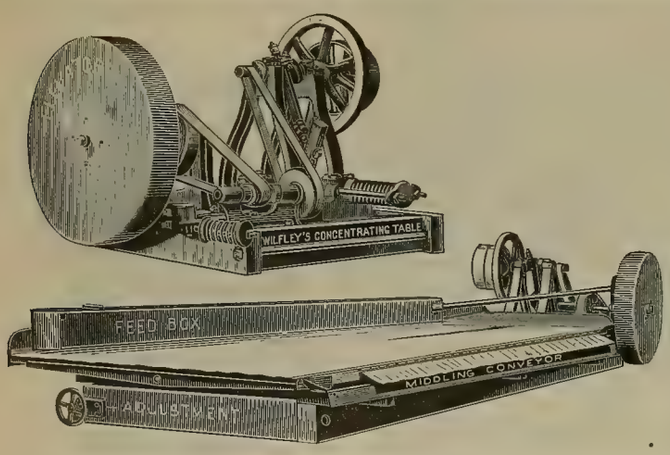
MANUFACTURERS OF

Mining & Milling Machinery,

Automatic Cut-Off Engines, High-Speed Engines, Hoisting Engines,
Quartz Mills, Manty Chili Mills,

PUMPS---CORNISH AND OTHER.

Rolls and Concentrating Machinery,
Copper and Lead Furnaces.



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ARE SOLE AGENTS FOR THE

Wilfley Concentrating Table,

And claim for it BETTER work than any Concentrator made, with a capacity of from 15 to 25 tons per day of 24 hours. It is simplicity itself. No moving belts or intricate parts. Anyone can learn to operate in an hour.

For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Col.; M. E. Smith Concentrator, Golden, Col.; Mary Murphy Mine, St. Elmo, Col.; W. E. Renshaw, Mayflower Mill, Idaho Springs, Col.; W. H. Bellows, Boyd Mill, Boulder, Col.; H. E. Woods, Denver, Col.

ROMLEY, COLO., Jan. 19, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Answering yours of the 5th inst., would state that after a thorough trial we have discarded nine other concentrators and adopted the Wilfley Concentrating Table, which we think up to date is the best table in the market, so far as our knowledge is concerned. Yours very truly, [SIGNED] B. B. MORLEY, M'g'r Golf M. & M. Co.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

PRICE, $450.00.

W. H. BIRCH & CO.,

Office and Works, 127-129-131-133-135 First Street, San Francisco, Cal.

WRITE FOR A CIRCULAR ON THE

"BIRCH" IMPROVED TWO-STAMP MILL.

IRON FRAME, TRIPLE DISCHARGE, 850-LB. STAMPS, FORGED STEEL SHOES AND DIES.

Price, $450 f. o. b.

CALIFORNIA ELECTRICAL WORKS.

Dynamos, Motors, Hoisting Apparatus, Arc and Incandescent Lamps, Instruments, and General Supplies.

TELEPHONE AND LINE CONSTRUCTION. LONG DISTANCE POWER TRANSMISSION A SPECIALTY.

Office and Works: 409 MARKET ST., SAN FRANCISCO, CAL.

Coast Industrial Notes.

—Forty-five car loads of walnuts, valued at nearly $70,000, were shipped from Fullerton, Cal., last year.

—American railroad interests and British commercial influences have succeeded in sidetracking the Nicaragua Canal project in this session of the national Congress.

—The Suisun, Cal., Board of City Trustees has awarded $42,000 water bonds to the San Francisco Bridge Company, which contracts to put in water works for $32,034.

—The San Pedro Oil Company has incorporated at Los Angeles; E. T. Howe, Pasadena; W. H. Obear, W. Duncan, A. Dodd, Los Angeles; H. J. Muller, San Pedro; capital stock, $500,000.

—The McCloud River Railroad Co. has incorporated to build from Sissons to Fall river, in Shasta county, Cal. W. E. Brown, W. W. Van Arsdale, D. W. Earl, J. D. Brown and G. W. Scott have each subscribed $13,200.

—The Fitzhugh Electric Power Company of San Francisco propose to build an electric plant on the Stanislaus river, three miles from Tuttletown, Cal., with 3000 horse power, to deliver to the mines from Fourth Crossing in Calaveras county to Jacksonville.

—At a meeting of the Ways and Means Committee of the State Legislature last week it was decided to recommend for passage the bill appropriating $10,000 for an exhibit of California products at the Guatemalan Exposition to be held this summer.

—A contract was granted by the Mexican Government for the construction of a vitrified sewer pipe factory in the City of Mexico to C. C. Merrill of Los Angeles, and it was completed last month. A bond in $10,000 was deposited as a guarantee that $400,000 would be expended.

—E. B. Rambo of San Francisco has concluded the purchase of 130 acres of land lying on San Diego bay, above Roseville. It is claimed that a railroad deal is in progress to connect Salt Lake and San Diego and giving the Union Pacific an outlet to the Pacific Coast independent of the Central Pacific, and that this purchase was made in the Vanderbilt interests.

—D. McLean tells the Salt Lake, Utah, *Herald* that "the Pacific Short Line is to be built through to the coast, grading to begin about May 1st. C. K. Bannister is to be the chief engineer in charge of the entire line. The route is through Ogden and Salt Lake, around the lake to the south; across the Deep Creek country, over Beckwith's pass and on to San Francisco."

—Work has been resumed on the tunnel of the Turlock Irrigation Canal system, under a contract entered into with Judge J. A. Waymire in the spring of 1896. There remains 250 feet of the tunnel, out of a total of 650 feet, to excavate. Waymire's contract is for the payment of about $350,000 for putting the entire system in working order, so that the water will run over the district, which comprises 170,000 acres.

—The Mexican government has awarded the contract for the making of a harbor where ships may safely anchor at Mazatlan. The specifications call for the construction of a first-class harbor with a depth of not less than 30 feet, thereby facilitating the anchorage of ships of the heaviest tonnage. At present ships anchor in the roadstead, but it is thought that the harbor can be safely made in what was originally known as the Puerto Viejo, and where ships formerly hove to. The amount to be expended will approximate $10,000,000 Mexican silver.

Recently Declared Mining Dividends.

The Coronas M. Co., Mexico, $1500, Jan. 15th.

Portland M. Co., Colorado, 1 cent per share, Jan. 15th.

Ontario, Utah, M. Co., 10 cents per share, payable to-day.

Santa Rosalie, Mexico, M. Co., 5 cents per share, Jan. 26th.

The Homestake, South Dakoka, 25 cents per share, Jan. 25th.

Alaska-Mexican M. Co., 10 cents per share, $18,000, Jan. 28th.

Alaska-Treadwell M. Co., 37½ cents per share, $75,000, Jan. 28th.

The Elkton Consolidated, Colorado, 20 cents per share, $25,000, Jan. 20th.

Anchoria-Leland M. Co., Colorado, 1 cent per share, $6000, Jan. 15th.

Boston-Montana, Montana, $450,000: payable Feb. 20th. In 1896 the company declared two dividends of $2 each and two dividends of $2 and $1 extra each, making $10 per share on 150,000 shares for the year. In 1895 the company paid $2 on May 20th and $5 on Nov. 20th, or $7 for the year. In 1894 it paid two dividends of $1 each. This dividend makes total dividends to date $5,375,000.

THE OVERLAND LIMITED, VIA UNION PACIFIC

Only 3 1-2 Days to Chicago-----3 1-2.
Only 4 1-2 Days to New York---4 1-2.

The Union Pacific is the only line running Pullman double Drawing-Room sleepers and Dining Cars San Francisco to Chicago daily without change. Only one change to New York; dining car service entire distance. Vestibuled composite buffet smoking and library cars between Ogden and Chicago.

The only line running upholstered Pullman Tourist sleepers San Francisco to Chicago daily without change, and personally conducted excursions to St. Paul and Chicago without change, leaving San Francisco every Friday.

Tickets and sleeping-car reservations at No. 1 Montgomery St. Steamship tickets on sale to and from all points in Europe. D. W. HITCHCOCK, General Agent, San Francisco.

Recent California Mining Incorporations.

Curtis M. Co.; J. F., W. W. and A. H. Curtis, J. H. Sivers, H. W. Snow; capital stock, $500,000 $500 subscribed.

La Descubridora M. Co., San Francisco; J. G. Follansbee, J. Smith, T. Turner, R. and J. Clark; capital stock, $300,000—$15 subscribed.

Rose Creek G. M. & M. Co.; E. W. and H. Tucker, F. D. Bepler, T. O'Neill, C. Rapp, H. C. Tabrett, G. E. Bridgett; capital stock, $100,000—$7000 subscribed.

Kensington G. M. Co., San Francisco; F. L. Colton, J. G. Brown, E. and W. M. Painter, A. W. Moore; capital stock, $100,000—$250 subscribed.

Reddick Mining Co., Grass Valley, Cal.; capital stock, $100,000—all subscribed; J. F. Kidder, E. H. Brown, G. Fletcher, Grass Valley; C. P. Longbridge, Nevada City; W. E. Brown, San Francisco.

Colorado River Mining Co., San Diego; capital stock, $1,000,000—all subscribed; J. H. Bowman, J. Connor, Holbrook, Arizona; G. W. Beermaker, W. F. and J. L. Stearns, Chula Vista; J. R. Stearns, Tia Juana; C. Kiessig, L. L. Greenwart, San Diego; M. Davis, National City.

Personal.

J. R. SMITH has been appointed superintendent of the Reward mine, on Grass Valley creek, Amador county, Cal.

HENRY BRATNOBER has left New York since the close of the deal in the Tomboy at Telluride, Colorado, and will go to Tintic and other camps in Utah.

ROBERT DUNCAN, JR., superintendent of the Alaska-Treadwell properties, has returned to Alaska, but is expected to come to San Francisco again within a few weeks.

VICTOR M. CLEMENT, formerly of Grass Valley, who has returned from South Africa, is making an examination of the Mercur property in Utah, upon which Capt. De Lamar has an option for an English syndicate at $1,500,000.

COLORADO'S GOLD FIELDS.

Millions Upon Millions of Dollars in Gold Have Been Added to the World's Wealth.

It is a well-known fact that the richest and most famous gold mines in the known world are those of Colorado, many of which are paying to fortunate investors millions of dollars annually in dividends. Some shrewd persons who invested only a few dollars are now receiving hundreds and thousands in profits, and, judging from present indications, there are more desirable chances to invest just now than ever before. New mines are discovered daily and old ones strike richer veins of gold.

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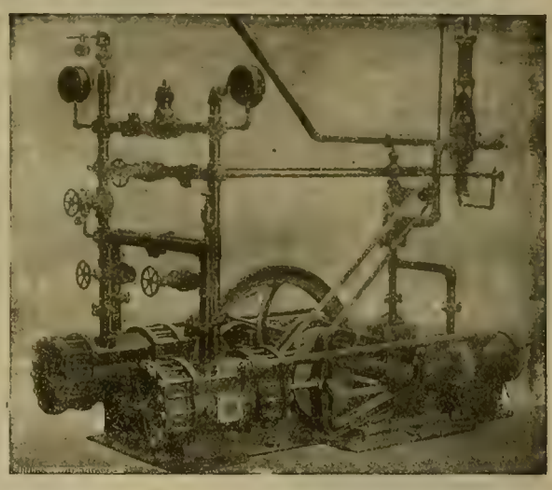
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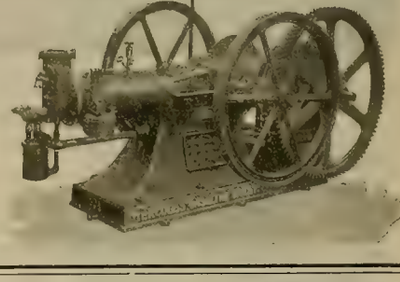
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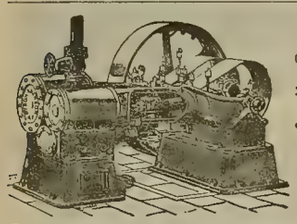
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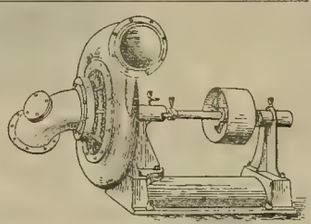
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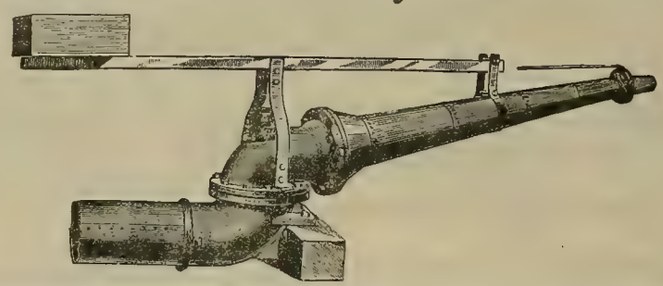


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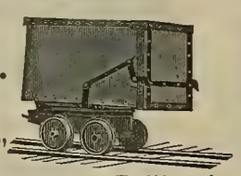


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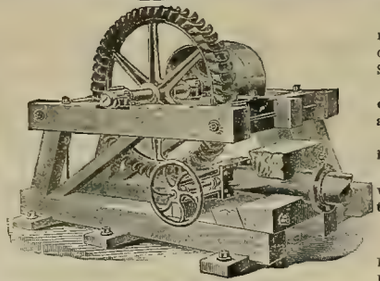
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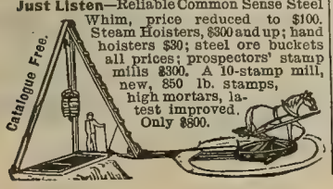
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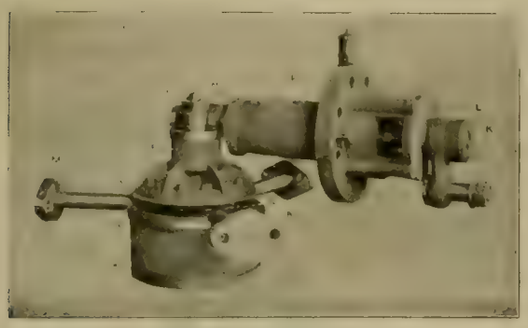
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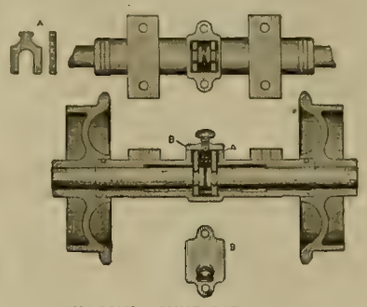
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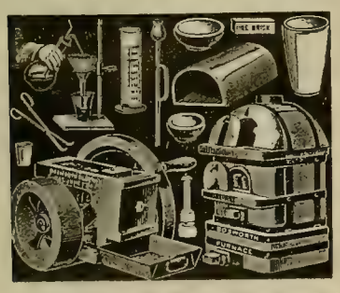
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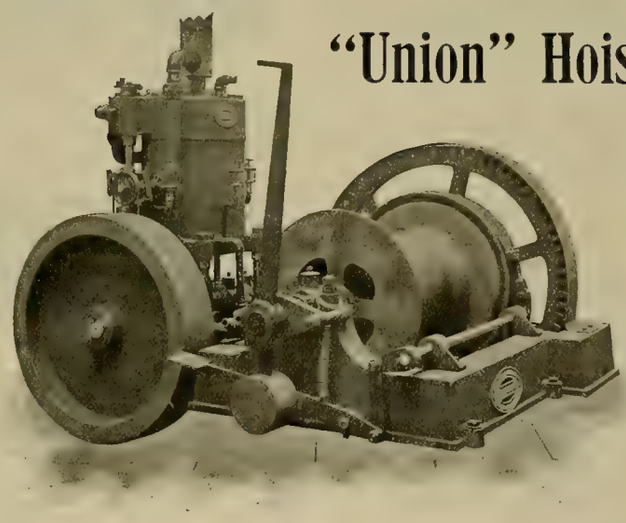
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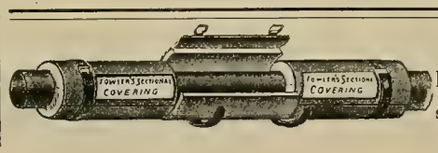
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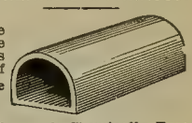
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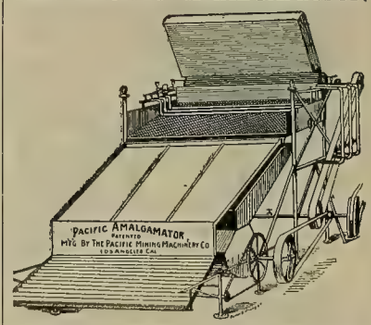
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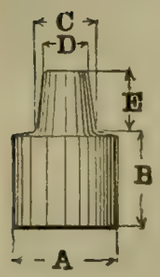
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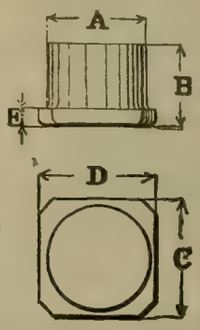
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List of U. S. Patents for Pacific Coast Inventors.

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FOR THE WEEK ENDING JANUARY 12, 1897.

575,095.—SIEVE FOR THRESHERS—W. Bartelt, Fairfield, Wash.
575,142.—CONCENTRATOR BELT—W. F. Bowers, S. F.
574,891.—FRUIT SLICER—Hattie Debzell, Jackson, Cal.
575,217.—TRACE BUCKLE—C. F. Demmon, Sacramento, Cal.
575,223.—CAR COUPLING—Ferguson & Miller, Glendora, Cal.
575,155.—SLIDE VALVE—G. R. Herricks, S. F.
575,159.—SOAP HOLDER—G. W. Johnson, S. F.
575,124.—ROTARY ENGINE—M. Matson, Sedro, Wash.
575,285.—EXTENSION TABLE—W. H. Mays, Los Angeles, Cal.
575,284.—CONVEYOR—McCabe & Anderson, Tacoma, Wash
575,266.—HANDLE BAR—McCollum & Knoll, Riverside, Cal.
575,178.—PROPULSION OF VESSELS—F. O. Slanker, Pomona, Cal.
575,190.—TYPEWRITER—L. E. Wilkes, Hillsborough, Or.

FOR THE WEEK ENDING JANUARY 19, 1897.

575,662.—HEEL PLATE—H. P. Andresen, Seattle, Wash.
575,543.—TRESTLE—T. A. Clark, Portland, Or.
575,347.—BICYCLE ATTACHMENT—Dehlin & Clark, Seattle, Wash.
575,355.—LIQUID ELEVATOR—W. M. Kiddie, Clifton, A. T.
575,390.—NET CONTROLLER—T. Lindsay, Capitola, Cal.
575,610.—TOOTH POWDER BOX—P. S. Malcolm, Portland, Or.
575,402.—CRIB COUNTER—W. H. Martin, National Military Home, Cal.
575,612.—CAR COUPLING—L. Mendelson, San Diego, Cal.
575,572.—SHADE ROLLER—G. M. Parsons, Carson, Nev.
575,573.—CONTROLLER—O. H. & A. F. Pioper, San Jose, Cal.
575,574.—EXTENSION LADDER—J. M. Pugh, Reno, Nev.
575,380.—MUCILAGE BOTTLE—A. Shackleton, Merlin, Or.
575,443.—CORSET STEEL—Chloe F. Tilton, S. F.
575,447.—PAPER CUTTER—M. F. Tytler, Seattle, Wash.
575,406.—BICYCLE SEAT—C. E. Wheeland, Seattle, Wash.
575,672.—PREPAYMENT METER—H. W. Williams, San Leandro, Cal.
28,539.—DESIGN FOR BEER KEG GUARD—A. H. Schram, Oregon City, Or.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail for telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

PREPAYMENT ATTACHMENT FOR METERS.—Hugh W. Williams, San Leandro, Cal. No. 575,672. Dated Jan. 19, 1897. This invention relates to improvements in mechanism and construction of attachments for meters whereby the introduction of a coin of given value into the apparatus sets free a mechanism which will operate until an amount of gas has passed through the meter equal to the value of the coin which has been deposited. It consists essentially in the combination of a normally closed valve for controlling the meter connection, a means dependent upon the deposit of a coin for opening the valve, means for holding the valve open and permitting it to close at the expiration of a given time, comprising a rotatable screw, a lever connected with the valve, a slidable finger adapted to engage the screw and hold the lever and maintain the valve open during the engagement and to allow the valve to close when the engagement terminates by the rotation of the screw. In conjunction with this mechanism is an indicator operated by the sliding of the screw and a plurality of distinct scales over which the indicator plays so that the sliding movement of the screw may be varied in accordance with the correspondence of its sections with the distinct scales.

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Until within the last two or three years no adequate means of reduction of Tintic ores was in operation in the district and the production of the mines was limited to those ores sufficiently rich to be shipped to the smelters for treatment, but this has been changed by the erection of immense combination and concentration milling plants which can work at a profit those immense deposits of low grade ores which fill all the producing mines of the district. Four of these mills are in active operation, and three others will undoubtedly be erected within the next year.

The ores of Tintic are greatly diversified in character. The principal metals produced are gold, silver, copper and lead. In silver production Tintic leads the State, while in the production of gold it stands second on the list. Beside the big bonanzas above mentioned there are some twenty-five or more properties that now and in the past have been producing mines, and to these may be added a score of others which have paid for their development by their products, and upon which the recent rivival of the mining industry has had the effect of a recommencement of operations.

Tintic has four thriving towns—Eureka, the business center of the district, with a population of 2,500; Mammoth, population 1,000; Robinson and Silver City, 500 each, all of which offer great inducements for investments in a business way.

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The Rio Grande Western Railway has a double daily train service between Salt Lake City and the Tintic Mining District. For further particulars apply to F. A. WADLEIGH, General Passenger Agent, Salt Lake City.

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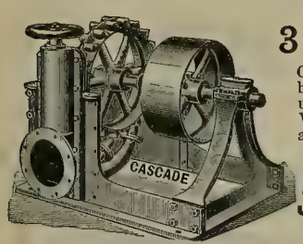
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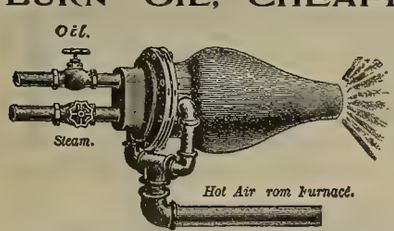
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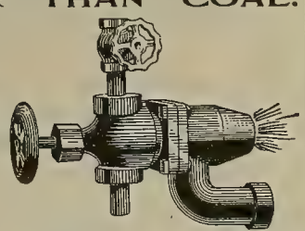
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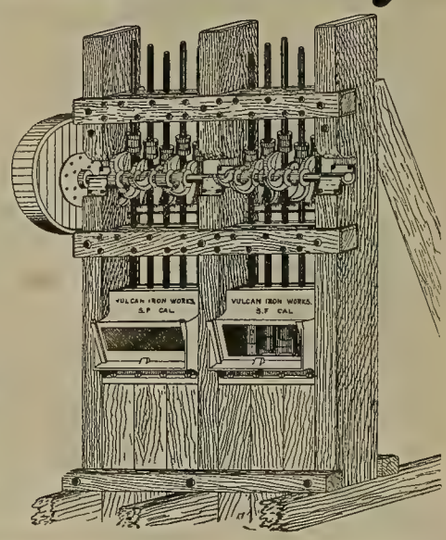
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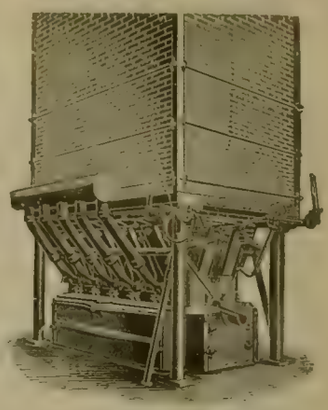
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Salt Lake City, Utah.
Spokane, Wash.
New York City, N. Y.
Chicago, Ill.
St. Louis, Mo
In Mexico—
San Luis Potosi,
City of Mexico
Chihuahua,
Pachuca,
Hermosillo
Jimenez.

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C. D. Porter, Spokane, Wash.
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The Edward P. Allis Company, Milwaukee, Wis.

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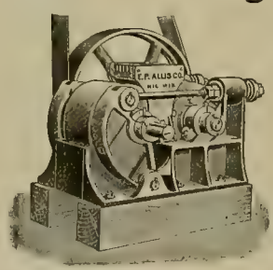
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Market Reports.

The Markets.

SAN FRANCISCO, Jan. 28, 1897.

Trade continues to steadily improve. While the buying is largely of a hand-to-mouth character, yet it is enlarging—that is, more dealers come in daily, which makes each week's aggregate sales show an increase over preceding. If it was not for tariff tinkering, there would be a decided revival in business; but the uncertainty as to the import duties on foreign products, raw and manufactured, creates a feeling of uncertainty and more or less uneasiness. It looks now as if by the close of February the new bill will have been so far formulated as to give some degree of assurance as to what can be expected, and, if this proves correct, then large handlers of goods and all kinds of manufacturers can operate with more confidence, knowing that, for four years at least, the tariff question will be out of the way. A tour among the manufacturers shows that the majority are fairly busy for the season of the year. They speak quite hopefully of the future, particularly manufacturers of mining machinery and farm implements. This hopeful feeling is created by authentic reports that there will be more activity in gold and copper mining than has before been known on this coast, and this will call for machinery, while large crop prospects makes it quite certain that there will be more inquiry for farm implements.

In the local money market there is continued ease with an increasing call for first-class paper. The large accumulation of idle money in the banks and a light call for accommodations is doing no little in shading the rate of interest on gilt-edge security. For a better investment many holders of money are turning to the better class of local securities—those that pay dividends. This demand has strengthened the market for them. The East continues to report a plethora of money with the rate of interest for call loans at 1½ per cent per year by trust companies and 2 per cent by banks. The easing of money markets abroad, with the rate of interest in the London open market at 2⅝ per cent, is calculated to work against, for the time being at least, an advance in interest at New York. The exports of products from Atlantic seaports are falling off, but still they are in excess of imports. The balance in this country's favor meets dividend and interest payments abroad and also any selling of American securities held in Europe.

New York Silver Prices.

NEW YORK, Jan. 28.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	29¾	64⅞
Saturday	29¾	64⅞
Monday	29 13-16	65
Tuesday	29 13-16	65
Wednesday	29 13-16	65
Thursday	29 13-16	65

	Copper.	Lead.	Iron.	Tin.
Friday	12 00	3 10	11 00@13 00	13 50
Saturday	12 00	3 07½	11 00@13 00	13 60
Monday	12 00	3 05	11 00@13 00	13 65
Tuesday	12 00	3 05	11 00@13 00	13 75
Wednesday	12 00	3 05	11 00@13 00	13 75

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	.15c Prem
New York Telegraphic Transfer	17½c Prem
London Bankers' 60 days	$4.85¼
London Merchants	$4.84½
London Sight Bankers	$4.88¼
Refined Silver, per oz., 1000 fine	64¾
Mexican Dollars	52@52½

SILVER.—The market has shown more strength, with an advance of ¼ cent an ounce on the week's business. This improvement was predicted by the MINING AND SCIENTIFIC PRESS. It ought not to cause surprise if the markets at home and abroad do not move to fully as high figures as ruled last year. The shipments of bullion from New York are quite large, but it seems as though they were all provided for before arrival out, for English markets, instead of declining, are advancing.

MEXICAN DOLLARS.—The Chinese New Year's demand will be over soon, but while it lasts shipments there will be free. Both New York and London report large shipments to meet requirements in China during that holiday season.

ANTIMONY.—Our market is quoted at 7⅛@8c in a jobbing way. New York mail advices quote 7½c for Cookson's, 6½@6⅝c for Hallett's and 6½c for Japanese.

QUICKSILVER.—The demand is good for the season. The shipments by water to Mexico have been light for fully two weeks past. The market is unchanged so far as quotations are concerned.

The market is quoted as follows:

Domestic trade, per flask	36 40

For export, quotations are nominal but less than for home.

COPPER.—The market continues strong, both at home and abroad. The impression prevails that when the spring and summer demand sets in, still better prices will rule. This opinion is grounded on the belief that in this country the consumption will be fully 25 per cent more than last year's, while that in Europe will not show any falling off, with the probability that it will show an increase. With increased consumption and no decided increase in production, sellers will have the advantage.

The local market is quoted as follows:

Ingot, jobbing	14½@—
Ingot, wholesale	13½@—
Sheet copper	17 @—
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17c
Lake Superior Sheathing	20

LEAD.—The market has held firm throughout the week.

Pig	— @ 3 75
Bar	— @ 4 00
Sheet	— @ 5 25
Pipe	— @ 4 50

SHOT.—There is a moderate demand.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 20
Drop, B and larger sizes, " "	1 45
Buck, Balls and Chilled, do. " "	1 45

BORAX.—Shipments to the East are fair. The market is steady.

The market is quoted as follows:

Refined, in car lots	5
Refined, in sacks	4¾
Powdered, in car lots	4½
Concentrated, "	5

TIN.—The markets at the East and abroad are higher, with the tendency to still better figures. It looks as if the speculative pool will be successful in promoting their deal, particularly if silver advances, so that it will cost more to lay down pig from the Straits. Our market is firming up for both plate and pig.

We quote as follows:

Pig, per lb	14½c@ —
Plate, I C coke, heavy, per box	$4 05@ —
" " " light, "	3 95@ —

IRON.—The consumption of pig is said to be increasing. Eastern advices indicate a steadier tone, with the outlook favorable for a large increase in business. It would seem from our advices that the larger producers of Bessemer expect a strong fight. At Milwaukee two iron mining companies held their annual meetings. the Metropolitan, which owns the largest Gogebic range mine, and the Aurora, which olso owns a Gogebic mine that produces ore of the Bessemer grade. In both instances, the reports to the stockholders expressed sanguine views with respect to the season of 1897, although operations in 1896 were highly unsatisfactory, the Metropolitan having shipped less than half as much ore as in 1895. These properties, if any, will be affected by the Carnegie-Rockefeller combination, but the Gogebic miners seem to think that they can hold their own. Both Northwest and Wisconsin share the belief of the mine owners that the coming season will bring improvement and both companies are preparing to handle an increased business.

AMERICAN.

	To Arrive.	Spot.
Sloss	$21 00	$23 50
Thomas	22 00	23 50
Salisbury	30 00	33 00

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—There is nothing new to report. The demand is free and the market for nearly all kinds is steady to firm.

We quote as follows:

SPOT FROM YARD—PER TON.

Wellington	$8 00@— —
Greta	6 00@ 6 50
Nanaimo	6 50@ 7 00
Gilman	5 50@ 6 00
Seattle	5 50@ 6 00
Coos Bay	— —@ 5 00
Cannel	8 00@— —
Egg, hard	12 00@13 00
Walsend	— —@ 6 50

TO ARRIVE—CARGO LOTS.

Australian	5 50
Liverpool Steam	6 25
Scotch Splint	— —
Cardiff	6 25
Lehigh Lump	9 00
Cumberland	13 00
Egg, hard	10 00
West Hartley	6 50

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

LUMBER.—Agents report a continued good shipping demand.

Redwood, Fluming	17 00	@	— —
Pine	14 00	@	19 00
Spruce	26 00	@	31 00

NAILS.—The market continued unsettled irregular.

Wire, carloads, basis per keg	....
" jobbing, " "	$2 40
Cut, carloads, " "	....
" jobbing, " "	2 25

POWDER.—The demand is fair.

The market is quoted as follows:

Hercules, No. 1*, per pound	11½c
" No. 2, " "	8½c

Mining Share Market.

SAN FRANCISCO, Jan. 28, 1897.

The market for the north-end shares advanced up to Monday, when Con. Virginia sold at $2.50. While the north-ends advanced the Gold Hill shares declined, but the middle shares firmed up. After the regular session on Monday Con. Virginia began to weaken, causing a decline in the other north-end shares and a weakening in the middle, but the Gold Hill shares held steady. Tuesday and Wednesday there was a further decline in the north-enders, but the Gold Hillers advanced slightly. This see-sawing process is something new to operators, who are somewhat mystified by it, but it looks very much like manipulation without regard to news from the mines. The advance in Con. Virginia was due to reports of a small strike—12 to 18 inches of ore, assaying from $75 to over $200 a ton. It had the effect to make some shorts fill, and, at the same time, bring in some outside buyers. The decline was due to official reports that several weeks' dead work would have to be done before they can find out its extent and value; or, in other words, be developed. The strengthening in the Gold Hill shares towards the close is as much of a mystery as was the decline. The prices ruling for some are too low, considering the work that has been done, and also that is being done, in the mines.

From the Comstock mines official letters do not report any material change in the general situation. The general tenor seems to be favorable, but at the same time it points to time and more money before results can be determined. In Utah work is continued on the same levels as heretofore reported. In Union there seems to be more active work on the 900-foot level. It is east, west and north. From Mexican our advices state that work is still continued on the 1000-foot level. It is to the west. The formation is favorable. In Ophir the work is to the west, both on the 1000-foot and Central tunnel levels. On the latter level in an old west crosscut they have run into some ore going over $24 to the ton. In Con. Virginia they are working on the 1000-foot, 1650-foot and 1750-foot levels. On the 1000-foot level they are running a south drift; on the 1650-foot level they are upraising so as to get at the ore reported on the 1550-foot level. They are working on several floors of the 1750-foot level. They extracted about 19 tons of ore last week assaying a little over $40 to the ton. In Andes repair work will soon be completed. Work is still continued by Best & Belcher and Gould & Curry on their joint east crossdrift from the 800-foot level of the Bonner shaft. The work in Savage ought to begin to attract attention before long. In Hale & Norcross they are still prospecting on the 900-foot level without, so far, showing up any ore. No work is being done by Chollar, but in Potosi work has been done on the 450-foot level toward the Bullion line. It is in the west. Bullion is still running a north drift. They are still working to the west in Alpha on the 500-foot level. From the Gold Hill mines official letters report that they are still pushing, but slowly, the west crossdrift. No work is being done by Challenge. A few tons of ore are being raised each week by Confidence. Preparatory work is being done by Overman for more extensive exploiting work on the 1100-foot level. They raise a few tons of ore each week. It is reported that work will be resumed before long by Caledonia. In Alta they are in vein matter carrying stringers of quartz going from $9 to $22 a ton.

Advices from the Brunswick lode are to the effect that work is being done on the 300-foot level of Best & Belcher and Gould & Curry; they are running a south drift and also an east crossdrift. The work in Savage is the same as heretofore reported. Chollar raised last week 70 tons of ore, assaying, by samples, nearly $35 in gold and a little over 22 ounces of silver per ton. The clean-up from 189 tons milled returned two bars of bullion, valued at $8221. They are working on the 200-foot, 300-foot, 400-foot and 500-foot levels in the same directions as before reported. In Occidental they are working on the same levels reported last week. There has been no change in the formation of the ground, but this is likely to be changed any day for the better, as the work is said to be in this direction.

The following illustrates the changes of the week:

Mines.	Jan. 21.	Jan. 28.
Alpha	$ 13	.....
Alta Consolidated	08	.....
Andes	15	$ 15
Belcher	42	37
Best & Belcher	75	66
Bodie	.....	.....
Bullion	.....	.....
Challenge	47	54
Chollar	94	96
Confidence	1 10	1 25
Consolidated California and Virginia	1 95	2 20
Consolidated New York	.....	.....
Crown Point	35	39
Exchequer	.....	.....
Gould & Curry	42	52
Hale & Norcross	1 30	1 25
Justice	.....	.....
Mexican	52	48
Ophir	1 20	1 15
Overman	14	14
Potosi	61	55
Savage	29	50
Sierra Nevada	53	47
Union	.....	43
Utah	04	.....
Yellow Jacket	34	37

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delin'q't and Sale.	Secretary.
Alta S M Co, Nev	54	5c	Dec 14	Jan 18..Feb 8	J E Jacobus, 309 Montgomery
Anita G M Co, Cal	12	5c	Dec 21	Feb 1..Feb 18	L F Reichling, 404 Montgomery
Best & Belcher M Co, Nev	61	25c	Jan 26	Mar 2..Mar 23	M Jaffe, 309 Montgomery
Bullion Con G M Co, Cal	10	10c	Nov 30	Jan 11..Feb 10	C A Grow, Mills Bldg
Con Cal & Va M Co, Nev	7	25c	Dec 8	Jan 14..Feb 4	A W Havens, 309 Montgomery
Confidence G M & M Co, Co	1	10c	Jan 19	Feb 27..Mar 20	F Aureguy, 320 Sansome
Crown Point G & S M Co, Nev	69	10c	Dec 9	Jan 13..Feb 3	Jas Newlands, Mills Bldg
Eureka Con Drift M Co, Cal	7	5c	Jan 20	Feb 26..Mar 20	D M Kent, 330 Pine
Eureka Con M Co, Nev	14	25c	Jan 18	Feb 23..Mar 15	H P Bush, 134 Market
Gould & Curry S M Co, Nev	80	15c	Dec 14	Jan 19..Feb 9	A K Durbrow, 309 Montgomery
Gold Hill M Co, Cal	11	25c	Jan 8	Feb 15..Mar 4	C A Grow, Mills Bldg
Gray Eagle M Co, Cal	45	5c	Dec 23	Jan 30..Feb 23	W J Gurnett, 308 Pine
Hale&Norcross S M Co, Nev	110	25c	Dec 8	Jan 11..Feb 1	R U Collins, 331 Pine
Hartmann Mining Co, Cal	1	5c	Dec 22	Feb 1..Feb 23	G W Peer, 4 Montgomery
Jamison M Co	9	5c	Nov 27	Feb 24..Apr 21	Sam W Cheyney, 120 Sutter
Julia Con M Co, Nev	28	5c	Jan 21	Feb 26..Mar 19	J Stadtfeldt Jr, 309 Montgomery
Marguerite G M & M Co, Cal	5	10c	Jan 14	Feb 25..Apr 8	Chas Peach, 237 Twelfth
Mineral Hill M & S Co, Cal	1	5c	Jan 4	Feb 15..Mar 25	Chas Peach, 210 Sansome
Reward G M Co, Cal	17	3c	Dec 19	Jan 20..Feb 5	S W Backus, Mills Building
Thorpe M Co, Cal	5	5c	Jan 13	Feb 23..Mar 15	A F Frey, 44 Phelan Building
Utah Con M Co, Nev	24	5c	Jan 14	Feb 17..Mar 8	A W Havens, 309 Montgomery

San Francisco Stock Board Sales.

SAN FRANCISCO, January 28, 1897.

9:30 A. M. SESSION.

200 Andes	15	550 Mexican	47
600 Belcher	37	200 Occidental	20
300 Best & Belcher	62	50 Ophir	1 10
100 Challenge	54	200 Overman	14
300 Chollar	88	200 Potosi	55
300 Con Cal & Va	2 05	500 Seg Belcher	11
150 Confidence	1 25	200 Sierra Nevada	47
1000 Con Imperial	02	200 Union	41
500 Crown Point	39	200 Yellow Jacket	37
200 Gould & Curry	48		

SECOND SESSION—2:30 P. M.

300 Ophir	1 15	600 H. & N	1 25
350 Mexican	48	500 Seg Belcher	11
200 Gould & Curry	52	200 Union	43
100 Best & Belcher	66	100 Challenge	54
350 Con Cal & Va	2 20	200 Standard	1 65
50 Savage	50	350 N. G. & C	35
500 Chollar	96		

Light requires eight minutes and eighteen seconds to pass from the sun to the earth when at its mean distance; therefore, when we look at the sun we see him, not where he actually is, but where he was about eight minutes and eighteen seconds ago; his true place is then always in advance of his apparent place.

WILL NEGOTIATE with owners or their duly authorized agents only.

WILL INVESTIGATE only thoroughly bona-fide properties, either Mines, Prospects or Mineral Lands, whose owners are willing to make reasonable terms. When sending reports on properties also send terms on which you are willing to sell or lease.

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Marquette, Mich., U. S. A.

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WILL GIVE Options, Leases, Bonds and Contracts on all kinds of Mines, Mining Properties and Mineral Lands.

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At present prices are a sure profit. Write us for prospectus and information regarding mines, producing and prospective producers. We have collected a list of properties that will interest you. Write us at once.

HOPKINS & JEWELL, P. O. Box 1201,
CRIPPLE CREEK, COLORADO.

Well Known Copper Mine
FOR SALE.

Mine well developed. Complete working plant. Situation and facilities first class. Address H. D. RANLETT, Ranlett, Amador County, Cal.

Rainfall and Temperature.

The following data for the week ending 5 A. M., January 27, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS	Total Rainfall for the Week	Total Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date	Average Seasonal Rainfall to Date	Maximum Temperature for the Week.	Minimum Temperature for the Week.
Eureka	32	23 80	23 32	23 72	60	36
Red Bluff	16	12 00	12 53	14 68	62	34
Sacramento	22	7 31	10 13	10 77	57	36
San Francisco	06	11 20	10 74	13 10	57	42
Fresno		4 73	3 18	3 34	52	34
San Luis Obispo		9 70	10 03		74	36
Los Angeles		8 40	4 10	11 68	78	48
San Diego	01	6 53	2 30	5 36	72	46
Yuma		1 62	.32	1 97	72	44

Commercial Paragraphs.

J. GEO. LEYNER, machinist of Denver, has recently enlarged his facilities for business.

FLINT & LOMAN, electricians of Denver, have just built a 12 V., 250-ampere dynamo for the Denver Engineering Works Company, designed for a gold-saving process. It is built with no insulated wire on armature.

THE Risdon Iron Works of San Francisco have closed a contract with the French Flagstaff Mining Company, of Baker City, Oregon, to furnish a 10-stamp mill, Corliss engine, Johnson concentrators and other mining machinery. The mill will be equipped with all the latest improvements and will be delivered in Baker City in about four weeks. The Risdon will furnish for this mill their well-known and celebrated shoes and dies, made of hammered steel, and it will also contain other special features that will go to make up a very complete and first-class mill. In short, it will be a similar mill to that of the Bonanza mine of Clifford, this county, of which Albert Geiser is the manager.—Baker City Democrat.

THE contract for the electrical utilization of the Falls of St. Anthony, at Minneapolis, has been awarded to the General Electric Company. The St. Anthony Water Power Company and the Pillsbury flour mills and elevator lines were merged in the Pillsbury-Washburn Flour Mills Company, which controlled not only most of the developed water power of the falls, but also the undeveloped water power below the falls. A dam to utilize this power was constructed, and the total available is calculated at 10,000-horse power. The water will pass through turbines, seven of which, each of 1000-horse power capacity, will form the initial hydraulic equipment. The electrical equipment will consist of a plant comprising both direct current railway apparatus for the needs of Minneapolis, and three-phase apparatus for transmission of part of the power to St. Paul, ten miles distant.

THE Rocky Mountain Smelting Company has been incorporated in Colorado, the directors and incorporators being Chas. Foster of Fostoria, Ohio; Wilbur K. Johnson, Jas. B. Orman, John Coon, Harry M. Claffin. The officers are: Chas. Foster, president; William E. Johnson, vice-president; William Kopfer, secretary, and Geo. E. Ross-Lewin, treasurer. The capital stock is $750,000. The site selected for the building of a smelter is Florence, Colo., which possesses the advantages of cheap coal near at hand, abundance of fuel oil, and which is situate less than forty miles from the Cripple Creek mining district. The chief promoters of the enterprise are W. E. and W. K. Johnson, who built the Florence and Cripple Creek railroad. The new smelter, it is understood, will be built expressly with the view of treating Cripple Creek low-grade ores, in which the best known methods will be employed. Johnson Bros. and associates are likewise engaged in building a railroad from Florence to Silver Cliff, which will make large ore shipments from the latter point to Florence possible.

British Columbia.

W. J. R. COWELL, B.A., F.G.S., Mining Engineer,

Reports on mines, designs and superintends the erection of mining and milling machinery; makes analyses of ores, metals, soils, etc.; arranges for mill tests, and selects suitable processes for the treatment of ores. Correspondence invited. Address W. J. R. COWELL, Victoria, B. C.

British Columbia.

E. S. TOPPING, TRAIL, B. C.,

Has prospects for sale in Trail Creek and the whole of the Columbia basin. Will buy legitimate stock and mines for investors. Will examine mines. Has lots for sale in Trail and Deer Park.

British Columbia Gold Mines.

S. THORNTON LANGLEY,
JOHN McTEER REPASS,
Mining Investments.
RECORD BLOCK, - - ROSSLAND, B. C.
Correspondence Solicited.

WANTED.—Foreman to run a copper blast furnace, oxidized ores, in West Australia. Salary $175. Expenses out paid. One year engagement. Address ALFRED ROPP, Selby Smelting Works, Selby, Cal.

Assessment Notices.

HARTMANN MINING COMPANY. Location of principal place of business, San Francisco, California. Location of works, Chili Gulch Mining District, Calaveras County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 22nd day of December 1896, an assessment (No. 1) of 5 cents per share was levied upon the issued capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Room 46, No. 4 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of February, 1897, will be delinquent and advertised for sale at public auction, and unless payment is made before, will be sold on TUESDAY, the 23d day of February, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
G. W. PEER, Secretary.

Office—Room 46 No. 4 Montgomery street, San Francisco, California.

MINERAL HILL MINING AND SMELTING CO.—Location of principal place of business, San Francisco, California; location of works, Spenceville, Nevada County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 4th day of January, 1897, an assessment (No. 1) of five cents (5c) per share was levied upon the whole of the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 210 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of February, 1897, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 25th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
CHAS. PEACH, Secretary.

Office—210 Sansome street, San Francisco, California. Office hours from 1 to 3 o'clock P. M.

MARGUERITE GOLD MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of January, 1897, an assessment (No. 5) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 8th day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
CHAS. PEACH, Secretary.

Office—237 12th street, San Francisco, California. Office hours from 4 to 6 o'clock P. M.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 13th day of January, 1897, an assessment (No. 5) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of February, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9), of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the 26th day of January, 1897, an assessment (No. 61) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on TUESDAY, the 23d day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
M. JAFFE, Secretary.

Office—Room No. 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

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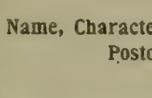
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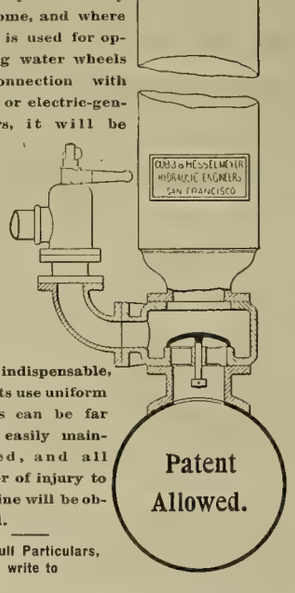
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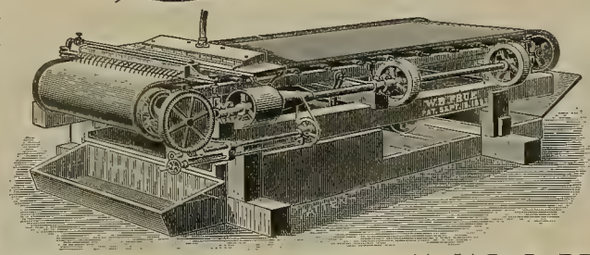
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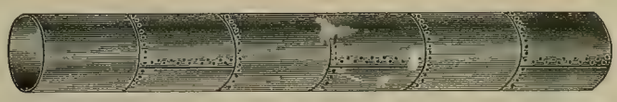
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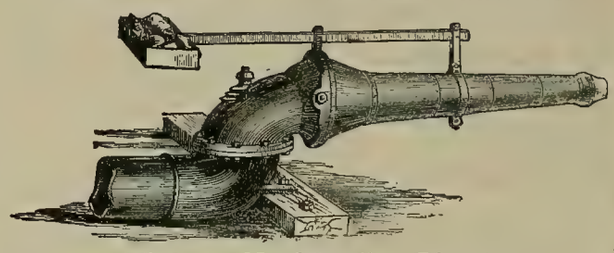
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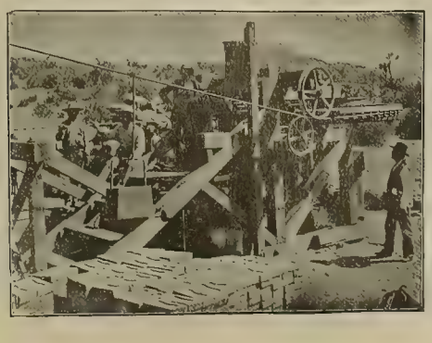
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No. 1909.—VOLUME LXXIV. Number 6. SAN FRANCISCO, SATURDAY, FEBRUARY 6, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Tomboy Mine.

The sale of a controlling interest in the Tomboy mine of Telluride, San Miguel county, Colorado, to the Exploration Company of London, at the rate of about $1,500,000 for the whole property, affords an illustration of the great profits in legitimate mining conducted on business lines. The property, when purchased by the people who have lately sold it, was known to be of value, but required capital for its development. It was a safe business proposition. They paid $105,000 for it in June, 1894, and, after putting considerable money in improvements, up to January 1, 1897, have paid in dividends $1,000,000. This, added to the difference between the purchasing and selling price, leaves a profit of nearly $2,500,000.

While there are large reserves, there is need for considerable further expenditure in improvements to take the best advantages of the possibilities in the mine. The Exploration Company purchased 51 per cent of the capital stock, and this gives them control. In order to increase the proportion of profits from the ore reserves in sight, further large expenditures are about to be made. Some $300,000 will be expended in increasing the milling capacity and in improving the facilities for taking out ore. Careful examinations have been made of the property with a view to determining not its present value so much as how the ores in sight or in prospect may be most economically worked, so that during the life of the mine as large a proportion of profits as possible may be made.

It is to be observed that the Exploration Company and other English investors during the past two years have turned their attention in the United States rather to old and well-developed properties which, with some improvements in the methods of working, will become worth more than under their old management. Such has been the case with the Anaconda in Montana, the Helena & Frisco in Idaho and the Tomboy in Colorado. Good prices have been paid by the English for all these properties, and yet they have made, or will make, them more valuable by better development and management at the outset than the previous owners could afford. This has been the policy of this particular English syndicate since its organization. Wiser than most English concerns, they employ agents and experts acquainted with local conditions and, instead of sending out foreign engineers, most of the men they have placed in charge of their properties in America, for which they have paid within the past two years nearly $50,000,000, are Americans.

On this page is an illustration from the Telluride, Col., *Journal*, of the Tomboy mill which, as at present equipped, can treat 225 tons of ore daily. It is understood that the capacity will be doubled and other improvements made and development work done that will involve an expenditure of some $300,000.

A crosscut tunnel from the mill level to the mines has been started, and, when completed, will, at a distance of 1900 feet from the face, tap the vein at a depth of 400 feet below the present workings. The total amount of development work in the way of tunnels, drifts and shafts done on the property up to the present time does not exceed 4000 feet, which is very little considering the output and the value of the property. The number of men employed under the system of the old management is about 210.



THE TOMBOY MILL, TELLURIDE, COLORADO.

A BILL, drafted by Hon. Tirey L. Ford, has been introduced in the Legislature as a substitute for the first proposed bill appropriating $250,000. The principal changes made are as to the power of the State Commissioner, who is made only a ministerial officer, and the power of determining as to the work is left to the Board of Examiners.

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J. F. HALLORAN.....General Manager

San Francisco, February 6, 1897.

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The Coming Rush to Alaska.

There promises to be more disappointed gold seekers returning from Alaska at the end of the coming season than last. They will have no reason to abuse the country nor claim that it is not a splendid field for men of small capital combined with some experience. Yet they will; for those who will be disappointed will be men who go unprepared and lured into the country by the visionary promises of transportation companies and others interested. A bureau of information—so it is called—has been established on Puget Sound, which is advertising over a large part of the United States fabulous stories of the wealth of Alaska. They have distributed posters in the depots along the Northern transcontinental lines and railways throughout Minnesota, Iowa, and parts of Missouri, Wisconsin and Illinois, and are extending the work into other States.

They are wise enough to do their work in those parts of the country where there are few miners and papers interested in that industry to prevent those from going who have neither experience nor sufficient means to carry themselves through in case of failure.

Of the presence of great wealth in Alaska there can be little question, but most of the men who will find it will be miners. There are men who have had little or no experience in mining who will do well, because they will go prepared to stay until they learn or join fortunes with men of more experience. No man should go to the Yukon placers unless he is prepared to stay for at least two seasons.

In the Yukon country rich placers have been discovered, but most of those lying along the creeks and easily accessible have been taken up or worked out, and most of the newcomers must go to the upper benches, where the ground must be thawed out by fire or with running water before it can be loosened. The mining season is very short—not over four or five months. As to quartz mining, none may hope to do much in that direction, further than making discoveries, without large capital, for the cost of carrying in the necessary machinery is very heavy.

Professor Christy's Article.

In this issue of the MINING AND SCIENTIFIC PRESS is published the conclusion of the very valuable paper "Solution and Precipitation of the Cyanide of Gold," by Professor S. B. Christy, of the College of Mines of the University of California. The work done by Professor Christy is valuable and timely. It is too often that men employed in scientific work devote their time rather to explaining how things have been done and going over old ground than in doing timely work that will be of immediate practical value. Through just such work as this of Prof. Christy can the University best win the confidence and support of the public.

In this paper Prof. Christy does not go beyond what he has proved in his own laboratories. In other words, he has given a solid basis for others to work on. Most of the articles heretofore written by able men on the subject have contained much of a suggestive nature rather than positive conclusions.

Power of Directors of Mining Corporations.

There has been introduced in the Assemby of California, by its Committee on Mines and Mining, a bill to amend the act of April 23, 1880, for the protection of stockholders in mining corporations so as to provide that it shall not be lawful for the directors of any mining corporation to sell, lease or mortgage or otherwise dispose of any part of the mining ground held by the corporation, or to purchase or obtain in any way (except by location) any additional mining ground without the consent of a majority of the stockholders.

In the State of Washington the law sets forth as follows:

"The corporate powers of a corporation shall be exercised by a board of not less than two trustees. A majority of the trustees shall form a board for the transaction of business; and every decision of a majority of the persons duly assembled as a board shall be valid as a corporate act."

The Spokane *Spokesman-Review* commenting on this says:

"If it be true, as contended, that the board of trustees may sell a mine or mines without the assent of the shareholders, it would be possible, under the law for three trustees in a board of nine to sell all the property of a corporation. Under this construction of the law, five trustees would constitute a quorum, and three would be a majority and could transfer the property."

The Oregon law in this respect is almost identical and Judge Deady of the United States District Court has ruled, in a case involving the right of the trustees of the Oregonian Railway Company, to make a lease practically amounting to a sale, as follows:

"The corporate powers of an incorporation formed under the laws of this State are vested in the directors, and the validity of their acts is not affected by the assent or dissent of the shareholders, and the powers of the latter are limited to the matters which concern the internal organization of the corporation."

Miners' Rights of Way.

There has been introduced in the California Legislature an act providing that every miner shall have the right of way across any and all mining claims, for the purpose of hauling quartz and all mineral-bearing ores, wood, timber and all supplies for mining purposes to and from his claim. This is in its general intent a good bill and should pass, provided some restriction is made as to payment of any actual damage.

No steps seem, however, to have been taken by the representatives of the mining districts toward securing the passage of a bill much in the same direction, but of far greater importance—a bill providing for a constitutional amendment that will make mining a public use and enable the owner of a mining claim to maintain proceedings in condemnation, in order to run tunnels and secure other rights of way upon paying just compensation for any damages that may accrue.

The adoption of such an amendment to the constitution can work no one a hardship, and it is not likely to be opposed by any except those harpies who make it a business to locate around valuable claims for the purpose of levying blackmail. In many districts in California are men whose main occupation is the location and relocation without assessment work of claims that they have no intention of working and that are valueless, except in so far as they may block some good mines' right of way. But aside from these cases there are many good reasons for the passage of the bill, many of which have been touched upon in previous issues of this paper.

Testimony of Experts.

Expert testimony in lawsuits in this country of doctors of medicine, civil and mining engineers and others, even when given by men whose reputation places them above reproach, is always looked upon much as the special plea of an attorney for one side—with suspicion. While in many cases it will be admitted that "nothing but the truth" has been told, "the whole truth" has not. The expert is employed by one side. The judge or the jury look upon his evidence as they do upon the speech of the counsel for the same side. This has done much to bring expert testimony into disrepute and does the experts themselves no good, as far as their reputations are concerned.

In this connection the following letter received from Prof. Frederic A. C. Perrine, D. Sc. of Leland Stanford Jr. University, is of interest and should be of value in inducing action:

"In the October *Atlantic* Professor John Trowbridge has published an article on the influence of expert testimony before the courts in its bearing upon the independence of experts and the justice meted by the courts, which is particularly important to mining engineers having many suits involving scientific opinion.

"Professor Trowbridge shows that in spite of the desire of the expert to give unbiased testimony the lawyers, by demanding uncategorical answers, may transform his opinion into something apparently entirely favorable to their case. Such uncategorical answers, being impossible as exact replies, are generally impossible to questions involving scientific and engineering experience.

"The remedy proposed by Professor Trowbridge has been often before indicated, and the method of obtaining expert testimony which he advocates is already in satisfactory use by the British admiralty courts and the German tribunals for deciding on patent rights. He proposes that no expert testimony should be allowed in any case except such as would be called by the courts themselves and the expense charged to the case exactly as are the wages of the judge and jury. Should this be done, the expert witnesses would be able to give their true opinions and place the facts before the courts in a clear light, which in the present system is not possible, both on account of the fact that the expert necessarily tends to further the side by which he is retained, and that the judges are unable to determine when a categorical answer should be necessary.

"In every court of the land this abuse has become recognized, until we find many judges deciding according to their own personal prejudices, without reference to the expert opinions, since these opinions seem to them to be distinctly biased, and because these experts are not scientific men telling 'the whole truth and nothing but the truth,' but are quasi advocates, endeavoring to the best of their ability to earn the fees paid them.

"The miners of California are endeavoring to obtain many modifications in the mining laws which will obtain for them greater justice in decisions involving mine rights, but it seems that no clear rights can ever be established by any modifications of the laws until the adjudication of the laws enacted be rendered in every case necessarily according to justice and not prejudice. Judges and juries may generally be relied upon to decide correctly concerning points of law or equity with which they are already familiar, but where a particular knowledge is necessary for a correct decision, and this knowledge is only within the range of an expert's information, all others are confused by the testimony given and a wide field left open for particular prejudices in legal decisions. This should be corrected, and it seems possible to solve the difficulty only by arranging for testimony on such disputed points which shall be clearly above suspicion; but we cannot expect to obtain such testimony under the present method of procedure nor will the procedure be changed until an industry directly affected will attempt to have the necessary laws passed. Should the miners or any other body of men undertake the passage of these laws, there is no reason to expect determined opposition from any quarter whatever, since their enactment would be a benefit to all parties concerned in litigation involving decisions dependent upon the information for which experts are generally called."

Concentrates.

OVER half the silver produced in Arizona last year came from the county of Mohave.

THE total capital stock of thirteen mining companies formed in British Columbia last week was $10,300,000.

THE contractors building the ditch for the Gold Creek, Nevada, Placer Mining Company have 200 men on their pay-roll.

F. B. TURNER of Butte, in the interest of Montana capital, has secured a site in Rossland, B. C., for the erection of a custom sampling plant.

BUTTE, Mont., is soon to have another smelter plant, to be constructed by the Occidental Smelting Company, composed of Pennsylvania and London capital.

FOR the month of January, 1897, San Francisco corporations paid a total of $1,061,851 in dividends, against a total of $1,120,392 for the corresponding month in 1896.

IN the Panamint district, east of Randsburg, Cal., a strike of rich ore is reported as made in the old Amargosa. Considerable prospecting is being done in the district.

THERE has been passed by the Senate a bill authorizing the entry and patenting of lands containing petroleum and other mineral oils under the placer mining laws of the United States.

THE Hidden Treasure Company, owners of the Dam drift mine at Centerville, Placer county, Cal., propose to put in an electric plant, with which the cars will be run in and out of the mine.

COL. W. W. D. TURNER of Spokane, one of the owners of the Le Roi mine at Rossland, British Columbia, is authority for the statement that they have been offered $4,000,000 for the mine and have refused it.

DURING the first three weeks of January eight mines at Rossland, B. C., shipped to smelters 3585 tons of ore, and in the third week of January from ten mines in the Slocan 554 tons were received at Kaslo.

THE citizens of Rossland, British Columbia, are making a determined effort to have the town incorporated, and it is probable that a bill giving them power will be passed by the provincial legislature this session.

J. A. YERINGTON has received an order from an Eastern syndicate to ship a carload of silicon from his mine near the Queen station in Nevada. If this test proves satisfactory, regular shipments will be made hereafter.

THE first annual report of the Golden Cache Mines Company of Vancouver, B. C., shows that considerable work has been done in the way of development on their properties at Lillooet and a 10-stamp mill has been contracted for.

A STRIKE of rich quartz in San Gabriel canyon, in Los Angeles county, Cal., is reported. For many years San Gabriel canyon has been prospected and worked. Years ago the mountains were known to contain quartz leads.

AN onyx factory is to be erected at Phœnix, Arizona, by people who have purchased some deposits of that mineral near there. At the Cave creek mine there is at present 700 tons of onyx on the dump and 1000 more in sight.

ACCORDING to a Placer county paper, the Anaconda Company of Montana have, through their agents, lately purchased from E. M. Smith of Coloma a tract of land lying between Pilot hill and Uniontown, El Dorado county, to mine for copper.

THE ten-ton cages for the compartment shafts of the Calumet & Hecla, Mich., mine are building. The two 4000 H. P. engines are designed to hoist the ten-ton cages at an average speed of 3000 feet per minute, or thirty-five miles an hour.

A DISCOVERY has been made of a ledge of onyx on the Bruneau river in Elko county, Nevada. There are two varieties—pearl and yellow. It is claimed that in the past Indians obtained their onyx for their ornaments from these deposits.

THERE is a proposition on foot to establish at Trail, B. C., a large gas plant, with the purpose of furnishing gas not only for lighting purposes, but also for fuel in the mines, the claim being made that this can be done more cheaply than the cost of wood.

A MILL and cyanide plant are being erected by the South Australian government for the treatment of gold ores in the Macdonnell range, a new district 1000 miles north of Adelaide, where good prospects have been found, but no large ore bodies developed.

T. S. TALIAFERO of Green River, Wyoming, has interested Chicago capital in the proposed erection of a soda evaporating plant. The plant will make a specialty of the manufacture of caustic soda, the water of the Green River well yielding 10 per cent of this variety.

ACCORDING to *l'Echo des Mines* of Paris, small veins carrying platinum have recently been found in syenitic rocks in Hungary. Platinum has also been found in veins of manganese ore existing in altered or decomposed syenites near Santa Rosa de Osos in Colombia.

NO PARTS of California are provided with worse roads than the mining districts, and nothing would tend more toward the development of mining than good roads. Senator Gleaves of Shasta proposes a bill providing for a system of State highways throughout the commonwealth.

THE Fortuna and other mines in Nevada county, Cal., have been purchased by the Summit Mining Company, owners of the Dannebroge, in Brown's Valley. The Fortuna was owned many years ago by the late ex-Congressman Frank Page. The new owners expect to put up a mill shortly.

AT present all land office business for Randsburg and the neighboring districts in Kern county, Cal., must be transacted at Independence, Inyo county, which is 150 miles away by stage. Steps are being taken to have these districts transferred to the jurisdiction of the Los Angeles land office.

THE dividends paid by the mines of the Rand, South Africa, in 1895 amounted to £2,518,418, and in 1896 to only £1,372,912; yet there was a slight increase in 1896 in the total output. In 1896 the Robinson paid £300,000 in dividends, the Ferreira £247,500, the Langlaate £141,000, and the Crown Reef £142,000.

THE Edna mine, on Spring Gulch, in Calaveras county, Cal., was sold last week to W. G. Adams, superintendent of the Bellweather mine at Jackson, who bought it for J. W. Hepburn, City Assessor of Chicago, for $85,000. It is proposed to enlarge the shaft to three compartments and sink 1000 feet.

DIRECTOR WALCOTT of the United States Geological Survey, in his report on the Yukon district, says that it has been found that not alone on the placers does the future of the Yukon placers rest. Running west of north through the valley is a broad continuous belt of quartz which will yield gold, silver, copper and lead. While the principal zone of ore is largely low grade, there are many indications of rich placers. The gold-bearing rock is of the same general quality as that found in the Treadwell mine.

IN the California Legislature last Wednesday the Committee on Mines and Mining reported as a substitute for the Senate Mining Debris Bill, the act upon the same subject drawn by the State Miners' Association. It carries an appropriation of $250,000, and was referred to the Finance Committee.

A DISPATCH from San Diego., Cal., announces that the Helvetia gold mine, one of the largest in the Julian district, and owned by W. H. Holcomb and others, has been bonded for $40,000 to a party of Denver capitalists. There is being driven a 1200-foot tunnel to tap a ledge 700 feet below the surface.

IN the Slocan district, in British Columbia, there are fifty mines from which ore is being shipped, and it is claimed that before the end of the year this number will be nearly doubled. Had it not been for the competition of railroads, that induced the building of branches, this district could not have made much of a showing.

IN British Guiana the sugar industry is declining, and the attention of the government and the people is being turned to gold mining more than ever. Some important discoveries have attracted the attention of the leading spirits of the colony. It is probable that, with the settling of the dispute with Venezuela, there will be considerable activity.

THE Fitzhugh Electric Power Company is about to begin the construction of an electric-power plant on the Stanislaus river near Tuttletown, Cal. The company proposes to install the plant with 3000 horse power, allowing a loss of 50 per cent, leaving 1500 horse power to deliver to the mines along the mother lode from Fourth Crossing in Calaveras county.

A MEMBER of the United States Geological Survey, who took part in the recent examination of the copper belt at Butte, Montana, writes: "It is still an open question with us as to whether the amount of copper washed away in the water from the mines of Butte district is not equal in value to the total output of all the mines of the district, if it could be saved."

ACCORDING to the official returns the gold yield of Victoria for the past year amounted to 805,807 ounces, of the value of £3,220,348, being an increase of 65,000 ounces. The yield up to date amounts to 60,991,408 ounces, of the value of £243,865,632. The gold yield of New Zealand for the quarter ending December amounted to 67,000 ounces, a decrease of 24,000 ounces.

THE Public Lands Committee of the House has received a petition from 350 citizens of Tuolumne county, asking that certain lands in the northern section of Yosemite Park be separated from the reservation, on the ground that the territory in question is too remote from the park to be of service as a pleasure ground, and, by reason of its location, is inaccessible in time of high water.

IN South Africa, through an arrangement made by Cecil Rhodes, the Cape government secures exclusive control of the whole Robinson railway system, with the exception of the Beira line, and there will be an extension built from Buluwayo to Salisbury. This will break down the barriers put up by the Boer government over the Transvaal system, it is claimed, in favor of the Rand.

LAST week Charles D. Lane and A. G. Campbell were paid $250,000 for their seventeen mines in Silver Bow Basin, Alaska, by Captain Thomas Mein, Robert Duncan Jr. and their associates. The corporation has been reorganized and will be known as the Alaska-Juneau Gold Mining Company; president, Henry Pichoir; vice-president, Thomas Mein; directors, W. W. Mein, Robert Duncan Jr. and Joseph Mooser.

THE Bank of England holds £34,518,092 gold, against £45,531,811 last year; the Bank of France, £76,333,590 gold and £49,044,797 silver, against £77,373,870 gold and £49,332,723 silver; the Bank of Germany £26,821,700 gold and £13,407,350 silver, against £29,116,190 gold and £14,340,810 silver, and the Bank of Austria-Hungary, £30,214,000 gold and £12,574,000 silver, against £34,409,000 gold and £12,660,000 silver.

D. C. LANE of Pomona has arranged to convey his mining interests in Inyo county, Cal., consisting of the Last Chance No. 2, Southwest and Sunshine mines, to a syndicate of Pomona capitalists for $80,000. This group adjoins the old silver mines of Darwin. The new syndicate will at once put up a 10-stamp mill, and will develop on a more extensive scale than before.

THREE transcontinental railroads are bidding for the branches leading into the mining country of British Columbia. These are the Canadian Pacific, the Northern Pacific and the Great Northern. The railroads that they want are the Spokane Falls & Northern, running from Spokane to Northport; the Columbia & Red Mountain, running from Northport to Rossland, and the Nelson & Fort Sheppard, running from Northport to Nelson, B. C.

AT Keswick, Shasta county, Cal., the Mountain Copper Company, Limited, are about to construct, under the direction of H. A. Keller, 100 additional stall roasters and two smelting furnaces. The excavation for the accommodation of the roasters is now completed and the quarry men are at work getting out rock for their construction. When they are erected the company will have four furnaces, each over 360 tons capacity every twenty-four hours.

THE Butte *Inter-Mountain* stated a short time ago that over $2,000,000 went to waste in smelter smoke each year in Butte. Now some chemists have under contemplation a plan to convert the fumes of the smelters into sulphur and begin the manufacture of chemicals in which sulphur forms the principal ingredient. All the sulphur used in the United States at the present time is imported, and during the present winter the price of this product has almost doubled.

THE December yield of gold in the Rand, South Africa, was 206,000 ounces—the second best monthly record. Now, it would appear that an effort is to be made to stir up more interest in London in the mines. John Hays Hammond goes down in a few days for the Consolidated Gold Fields, Limited, and it is given out that his purpose is to try to make improvements in the policy of working the mines that will increase the output and revive interest in them in the London market.

THE manager's report of the work done by the Horsefly Gold Mining Company of this city in its properties on Horsefly river, in the Cariboo district, B. C., shows that a ditch five miles in length, eight feet wide on top and four on the bottom and three feet deep has been dug, 15,000 feet of pipe, tools, giants, etc., have been taken in, roads and houses built and the mine put in shape to begin piping in the spring at a cost of $100,032.55, in addition to $80,000 paid for property and leases.

THERE were registered in 1896 in London 857 mining companies, with a total capitalization of £94,419,194, against 961 in 1895, with a total capitalization of £107,387,241. The decrease was due entirely to the cessation of the forming of South African companies. In companies formed to work mines in other parts of the world there was an increase. In 1895 there were formed 338 new South African companies, with a combined capital of £46,087,485, while the number in 1896 was only 113, with a combined capital of £18,520,064.

SAYS the Grass Valley, Cal., *Telegraph:* "Assemblyman Wm. S. Robinson will withdraw the mining bill introduced by him several days since, wherein it would require a bond of $5000 to be deposited by parties bonding mines, or, failing to do so, they would be fined $1000. Mr. Robinson introduced the bill in all candor, fully believing that it would meet with the approval of his constituents. As soon as he found out that the measure was strongly opposed by many who were engaged in mining, he had no further disposition to press the matter."

THE Colorado *Mining Investor* says that there is considerable experimenting with the mill at the Independence mine. It is now stated that W. S. Stratton, the owner, has about decided to take out the machinery and substitute a cyanide plant instead. It is claimed that the immense dump at the mine can all practically be made to pay a profit by the cyanide process. The mill was erected at an enormous expense and operated under a new process, known only to the discoverer and Stratton. The latter furnished the money to test its adaptability.

THE statutory meeting of the shareholders in the Jackson Exploration and Development Company, Limited, was held in London last month, when the chairman stated that the No. 1 shaft in the Amador mine was down 368 feet. A small chute worth 1 ounce 10 dwts. had been developed, but it was considered that the reef they were searching for, and which was known to be rich, would not be found until a depth of 500 feet was attained. The total cost per foot of the driving had been $23, but the manager thought he would be able to reduce the amount in the future.

LAST Monday the Butte and Boston Mining Company's property was sold by Receiver John F. Forbis in Butte. The property was bought by E. Rollins Morse, chairman of the Butte and Boston reorganization committee, for $2,550,000, but the bid was $50,000, the difference being represented by the incumbrances on the property. Immediately after the the equity redemption sale, J. O. Bender, special master, sold a portion of the property to satisfy a $1,000,000 mortgage, held by the Massachusetts Loan and Trust Company. Morse also bid it in for the account of the mortgage. This $1,000,000, however, is a part of the $2,550,000 included in the first sale.

A STOCKMAN has discovered a large body of gilsonite near Price, Utah, which is said to be 35 feet thick. The gilsonite deposits in the Uncompaghre reservation in the Uintah basin have attracted the attention of prospectors and capitalists for some time and have been the cause of special mention in a presidential message to Congress. Vertical cracks, varying in length from a few feet to several miles and in width from a few inches to 18 or 20 feet, are filled with this mineral. Six of these large veins, as they may be called, are estimated to contain 24,000,000 tons of gilsonite. It is used for many purposes, from paving to varnish for certain metals, and will not crack with ordinary bending.

THE Kootenay Water Supply Company of Waneta, British Columbia, and the Kootenay Hydraulic Mining Company, both owned by New York capitalists, have united for the purpose of erecting an electric plant for generating power for the district. The latter company have a large hydraulic plant on the Pend d'Oreille with water power which was used to work gold-bearing gravel banks near the boundary, but the gold was flaky and could not be saved by that method. Another system of saving the gold will be employed this summer. The water power held and owned by these companies will develop over 10,000 horse power, and the project now is to utilize this power in Rossland and other mining camps.

AT a meeting of the miners of Riverside county at Perris, Cal., last Saturday, the following resolutions were adopted: That our representatives in Congress be instructed to use every effort to secure the passage of the mineral lands bill at the present session of Congress; that our representatives in Congress be instructed to support and urge the adoption of the resolution recently introduced by Senator Perkins, looking toward the establishment of a Secretaryship of Mines and Minerals; that our representatives in Congress be requested to support the passage of an amendment to section 2326 of the Revised Statutes of the United States, defining what shall constitute a placer claim; that we are heartily in sympathy with the purpose and objects of the California State Miners' Association, and desire to co-operate therewith; that the district recorder of every organized mining district within the State be required by law to file with the county recorder a transcript of all notices of location recorded by him every three months.

NUMEROUS smelters are "proposed" here and there as though such a plant involved no more than the building of a 5-stamp mill. The proposers and projectors of many such ideas would do well to read the annual report of the directors of the Anaconda Copper Mining Co. of Montana. The directors therein explain an item of $3,609,665 which appears in the balance sheet as "loans" and outstanding accounts. They state that "from the time that the ore from the mines is extracted and delivered to the reduction works an average period of from four to five months elapses before the copper, silver and gold produced are paid for, rendering requisite a capital of over $4,000,000 to carry such products." This concern has a paid up capital of $30,000,000, but finds it necessary to borrow millions more to carry on its operations. Although it has a large refinery of its own, in which it refines half of the products of its smelter, it finds it more advantageous to ship the other half in the shape of matte to Eastern smelters rather than extend its own refining plant. These figures show the large financial resources which any company, proposing to engage in smelting operations on a considerable scale, and on a sound business basis, should possess, and should be remembered when any proposition, which appears to lack such necessary financial strength, is submitted for consideration, especially with a view of getting a subsidy.

The Solution and Precipitation of the Cyanide of Gold.*

NUMBER VIII.—CONCLUDED.

By S. B. CHRISTY, Professor of Mining and Metallurgy, University of California, Berkeley, Cal.

10. The Advantages of Precipitating the Gold by Means of Cuprous Salts.

It must be evident to those who have followed the progressive development of the cyanide process that, as the method is better understood, the constant tendency is towards the use of more and more dilute cyanide solutions. While in the beginning a solution of 1 per cent was used, this was first reduced to one-half, then one-quarter, and finally to one-tenth, and even one-twentieth, of 1 per cent. As the action of the so-called "cyanicides" contained in the ore is better understood and prevented, it seems not unlikely that the strength of the solution in potassium cyanide may be reduced to one one-hundredth of 1 per cent, or even lower. It should be remembered that much of the material treated by this process does not assay over $3 per ton, or only half of one one-thousandth of 1 per cent gold. So that a ton of solution of 0.01 per cent potassium cyanide solution contains thirty times as much cyanide as is needed to dissolve $3 worth of gold in a ton of ore.

The present methods of precipitation, the electrical and the zinc shavings method, both find in these dilute solutions their great difficulty. In the electrical process the resistance of such solutions is something enormous. In the case of the zinc shavings it is practically impossible to precipitate the gold from such a solution unless it contains one or two-tenths per cent free cyanide of potassium. This fact alone prevents the cyanide from being utilized to the best advantage.

In order that the cyanide should be utilized to the full, we should form the maximum of $KAuCy_2$ and leave a minimum of free KCy in the solution. This, as has been pointed out, is fatal to the precipitation of zinc shavings. But it is just here that the cuprous method of precipitation comes into play most efficiently.

In the treatment of such solutions with a bare excess of potassium cyanide, there is no method of precipitation yet invented that can compete with it. In such a case there is not enough cyanide of potassium in the solution to bother about saving it.

The method of procedure would then be as follows: The solution would be made slightly acid by sulphuric or sulphurous acid, as might be most convenient. Then there would be added a copper sulphate solution with common salt, which had been saturated with sulphurous acid. This solution should be added until the filtered solution gives a red precipitate with potassium ferrocyanide. The whole solution should be thoroughly stirred before this end-point is determined. A neat way to determine the end-point is to place a few drops of the stirred mixture on a double layer of fine filter-paper. On removing the upper layer, a drop of ferrocyanide of potassium will give a red precipitate of cuprous ferrocyanide on the wetted spot of the lower layer when the end-point is reached. This method avoids the delay of filtering the solution in the ordinary way. It would, of course, be best to determine the end-point beforehand, with a liter of solution, and then add the copper-salt to the mass of solution, after a preliminary calculation as to how much is required.

The solution should be allowed to stand for at least twelve hours, when it should be filtered. The filtrate should stand another twelve hours to see if any further precipitate forms; or it may be filtered first through CuS, to remove any suspended or dissolved gold, and then through old scrap iron to throw down any copper contents.

For the recovery of the gold from the cuprous aurocyanide Prof. de Wilde suggests three methods as follows:

"First Method.—Roasting in a reverberatory furnace. One obtains thus a residue of gold and of oxide of copper (CuO). This latter is then dissolved in sulphuric acid diluted to 20° Baume (or in dilute nitric or hydrochloric acid), and the gold remains in the residue as pure gold.

"At the same time the sulphate of copper is regenerated, which will serve to precipitate the gold in subsequent operations†, and the same quantity of copper may continue to serve. Owing to the sharpness of the reactions, the loss of copper will be insignificant.

"Second Method.—Solution of the cuprous cyanide in dilute chlorhydric or nitric acid; there remains a residue of aurous cyanide which, after washing and drying, is decomposed by heat and pure gold is left behind.

"Third Method.—The precipitate is heated with 60° Baume sulphuric acid in a porcelain or iron pot; it is entirely decomposed, leaving a residue of pure spongy gold. After cooling water is added, the precious metal is washed by decantation, dried and melted. The copper has been transformed into sulphate.

"The first method appears to me the most rational, the roasting being attempted once or twice a month only. It is an inexpensive operation, and the sulphate of copper is thus regenerated."

In this matter I agree with Prof. de Wilde. After being carefully dried, the conversion of the cyanide takes place very quietly at a low red heat, and the spongy, porous, black residue readily dissolves in the sulphuric acid, leaving the gold very clean. Care should be taken not to alloy the gold and copper by a reducing atmosphere and too much heat.

A fourth method would be to dissolve both gold and copper cyanide in a strong KCy solution, and precipitate pure gold by the dynamo. With less than 2.5 volts and a strong solution of KCy this is possible, the copper remaining in solution.‡ This I have verified. All the objections to electrolysis apply, except that the bulk of the solution would be small, and it would be concentrated.

In many cases it would probably prove more advantageous for the reduction works to ship this precipitate without attempting to reduce it, as the technical skill to do this occasional work is hard to get in mining camps.

The methods here outlined will certainly fail in the hands of those without chemical knowledge and engineering skill, and many unforeseen difficulties will probably have to be overcome before they can be utilized in practice. Nevertheless, I feel very confident that in some of the methods here outlined for the precipitation of gold by means of cuprous salts will be found the missing link in the chain of operations necessary to utilize the extremely dilute solutions of cyanide of potassium, which have been found effective in extracting gold from low-grade ores. If this should prove to be the case, and the usefulness of the method should be extended, particularly in California, my native State, I shall feel amply repaid for this long labor.

III.—THE TREATMENT OF ORES.

I have here reached the limit laid out for myself in the present paper. Still a few words on the application of the process to ores may not be out of place. In the first place, it should be said that the usual extraction from the South African tailings averages only from 60 to 70 per cent. While such results on low-grade products that can be treated in no other manner may be eminently satisfactory, they should be regarded as decidedly unsatisfactory for rich ores and concentrated sulphurets, assaying perhaps $100 per ton or upwards. It is to the treatment of such products, particularly the latter, that I have given the most attention. Although at first I could obtain extractions at most averaging not more than 70 or 80 per cent, I was finally able to reach uniform extractions that were eminently satisfactory with quite a wide range of ores. Thus, with the concentrated sulphurets from the Idaho mine, Grass Valley, assaying $120 per ton, I began with 70 per cent and finished with 98 and 99.45 per cent. With the Alaska-Treadwell concentrates, assaying $50 per ton, I began with 75 per cent extractions, and finished by extracting all but a trace. In a lot of concentrates from the Bald Eagle mine, Alaska, assaying $280 per ton, I was finally able to extract up to 97 per cent. On the other hand, with a lot of sulphurets from the Bay State mine, Amador county, California, assaying $160 per ton, 90 per cent is the best result yet obtained.

Each one of these ores demanded a long and painful study before these results could be obtained with any certainty, and there still remain some difficulties to be overcome before they can be reached on the large scale. Still there seems a strong probability this will be accomplished. And while it is unlikely that the cyanide process will displace any of the standard methods of gold-extraction it will certainly supplement them where they are weak, and will perhaps enable low-grade ores to be worked that will not now pay for chlorination.

I cannot close without a warning to those who expect extravagant results from this method in the hands of persons utterly ignorant of chemistry. No process was ever introduced requiring a more thorough and subtle chemical knowledge, and without it success is absolutely impossible. But engineering skill and experience are also equally indispensable, and success can only follow where these agents cooperate to produce the final result.

*Colorado meeting American Institute of Mining Engineers, Sept., 1896. (Revised Proofs Dec. '96.)

† The sulphate of copper thus regenerated should be crystallized by cooling the solution, and the crystals drained from the adherent acid mother liquor. A solution of sulphate of copper containing a notable quantity of sulphuric acid is not adapted to the precipitation of gold. The mother liquors, after being strengthened by the addition of sulphuric acid, serve very well for the attack of the mixture of oxide of copper and gold.

‡ H. Freudenberg, *Zeitschrift fur Physikalische Chemie*, xii, p. 97.

The Scene of California Mining Before 1849.

Up one of the big canyons in the Santa Monica mountains, a few miles north of the town of Santa Monica, are evidences of mining done fifty years ago or more. It is evident, too, that it was placer gold that they extracted, for the work was considerable and undoubtedly done by large forces of men. These former workings can be traced for more than a mile in one canyon, and through the nicely heaped dumps on either side trees are growing that would square, if sawed, 5 or 6 inches. Many of these trees (oak) are known to be of slow growth, and it is by them that the length of time that has elapsed since the work was done is estimated. These indications of former mining have stimulated prospectors at one time or another for many years to investigate the ground with pick, shovel and pan, but no good ever came of it further than a few "colors" of coarse gold. Some quartz is also found, but of such a low grade, and the vein matter being so small and "pockety," that this, too, was given up, and nothing like steady development of either the placer deposits or quartz leads has ever been prosecuted to any considerable extent.

The proverbial "oldest inhabitant" can throw no light on the subject of by whom these former workings was done, and it is a matter of perplexity wherever the matter is mentioned. That they succeeded in saving a great deal of gold, as evidenced by the amount the channel was worked, no one has a doubt. But where did they come from, and where did they go? are the questions that remain unanswered. There is a beautiful spring flowing from about the center of the old workings, used by those who of late years have tried to unravel the mystery. They have left a rocker there, yet in a good state of preservation, and once in a while one or more old California miners go up and work a spell, never returning with enough gold to reward them for their time and labor. Some think it was done under the direction of the Franciscan Fathers, and they had for their subjects natives, and the gold thus found was conveyed to Old Mexico and utilized for church ornaments.

The place of their habitation is also obscured, as it was hardly possible at that early period for water to have been developed in the valleys and plains below, where are now fine farms and orchards, and many believe that their homes while at work were in dugouts and tunnels in the steep sides of the canyon near the work. Prospecting for these old habitations has been talked of a great deal and but little work done toward it. The sides of the mountains here are very steep and dugouts could have been made with very little work. Some day, maybe, some old prospector will dig in there and find the beginning of these old places of rendezvous, and find something that will give to modern civilization some astonishing revelations of ancient mining. J. M.

Santa Monica, Jan. 24th, '97.

The Drainage of American Flat.

Written for the MINING AND SCIENTIFIC PRESS by DAN DE QUILLE.

NUMBER II.—CONCLUDED.

At Virginia City, beneath which place the Comstock was strongest and richest, is seen a great basin-like depression, with an uneven and eastward-sloping bottom, surrounded on all sides with rugged hills. It was the opinion of Professor W. Frank Stewart, an old Pacific coast prospector and semi-scientist, that wherever large flats or marked depressions occurred on the course of a lode there would be found the strongest and richest deposits of ore. This theory seemed to hold good on the Comstock. At Gold Hill there is a depression, similar to that at Virginia City, but smaller, and at Silver City, a short distance below, where is an extensive system of gold-bearing lodes that have been paying steadily for nearly forty years, there is another depression of irregular form and somewhat broader than that at Gold Hill. At American flat the depression is more marked and better defined than are any of those at the points mentioned above. Therefore, if there is anything in Professor Stewart's theory, there should be some good bonanzas on that section of the lode.

On the west side of American flat rises a high and rugged mountain ridge—a continuation of the main range at Virginia City of which Mount Davidson is the culminating peak—which shows many evidences of volcanic disturbances. This range of igneous rocks has as its predominant peak a mountain smaller than Mount Davidson, on the west side of which is an old volcanic crater that has thrown out a great amount of honeycombed lava; on the west side of Mount Davidson is a similar extinct crater. These two are the only old volcanic craters found in the mountain range in which the Comstock is situated.

At the west side of the flat, running along the base of the range mentioned above, is a large reef of gypsum; on its south side is an isolated mountain which evidently came up through the bottom of a lake, as it has on its summit a considerable depth of smoothly washed gravel. Although smoothly polished and apparently sound, all this gravel has been completely cooked and may be crushed to powder by the pressure of one's naked hands. When upheaved this mountain also brought up with it on its crest a lot of logs—parts of trees—all completely petrified. One of these logs was 2 feet in diameter and about 40 feet in length. On the east side of the flat are some low, rocky hills, among which are pushed up small areas of sedimentary rock. A patch of this of slaty character and blue-gray in color shows in its cleavage fractures very beautiful impressions of seaweed and other marine plants. These imprints of plants are red, brown and orange in hue, the leaf markings very distinct and the colors bright.

In the flat on the east side, near its outlet into American ravine, was a considerable area of placer ground, which was worked from time to time by various parties and paid small wages—$2.50 to $3 a day to each man. The gold in this ground evidently came from the croppings of the lodes above on the flat. In the rocky walls of the outlet of the flat is a large vein of low-grade gold-bearing quartz. The croppings average about $5 a ton, and by sinking on the vein much richer ore would likely to be found. Aside from the mines and metals it contains, this

section of the Comstock range is a very interesting region, and one in which a geologist would find many objects worthy of critical examination. In the large mountain on which are the petrified logs is a big vein of chalcedony, showing many beautiful arboresent forms and red, blue, green, white and brown in color. Some nodules of this mineral are quite opalescent, resembling Mexican fire opals.

The Comstock now occupies a secondary position among the mining camps of Nevada. The De Lamar, in Lincoln county, in the eastern part of the State, is now the leading mine of Nevada, and is one of the strongest and richest mines on the Pacific coast. The April Fool, Magnolia and other lodes in the same great gold belt are but little behind the De Lamar. Rich and extensive mines are being opened at the new camp of State Line, on the Utah border. At Osceola, White Pine, new discoveries in lode and placer and rich developments are being made, while the Dexter mine is giving new life to Tuscarora. In Elko county, at Island Mountain, an immense reservoir is being constructed and preparations are being made for working by hydraulic process some 6000 acres of wonderfully rich placers. Work is also in progress on several other areas of rich placer ground in the same county. Among these are the deep drift placers or drift diggings at Van Duzer creek, which are paying $100 a day to the man, with other diggings equally good being opened.

At present more enterprise is being shown by the miners of eastern Nevada than has lately been exhibited by those along the western border. Therefore, if the people of the Comstock would not fall still further behind, it behooves them to bestir themselves and make some new ventures by draining American flat, opening up the "west country," and by looking after the other "possibilities" of their famous old mining field.

The Gravel Fields of Northern California.

Probably as extensive and valuable placer mining enterprises as are in the world are in Trinity and Siskiyou counties, California. They embrace an area of 12,000 acres, and are being developed by French capital, introduced by Fred Beaudry. Some years ago he investigated the placer fields of Trinity and Siskiyou counties, secured some of the cream of the country and interested French capitalists, who now control the 12,000 acres of gold-bearing ground in the two counties.

Trinity and Siskiyou counties adjoin, the former on the south and the latter on the north, bordering on the State of Oregon. The country is mountainous, and the culminations are sharp, while the canyons and valleys are rich in auriferous gravel, eroded from the mountain slopes through the the lapse of centuries.

The Trinity county placers are on the Trinity river drainage. That stream flows into the Klamath, and the latter into the sea. The county is heavily timbered, well watered, and the climate is mild and equable. All up and down that region the sand and the gravel bars are flecked with the yellow metal. All this region is well timbered, watered and accessible by good roads.

In the purchase of grounds, building of ditches, flumes, pipe-lines, the establishment of giants, buildings, telephone and telegraph systems, electric plants, roads and bridges, sawmills, etc., more than $1,250,000 has already been expended, and the work of improvement and development goes steadily on. These syndicates have established the foundation of enterprises that will give employment to hundreds of men for a long time. At different times 400 or 500 men have already found employment on the various works. Of course, after these improvements are well established, and the enterprises are in full swing, less men will be required, and the profits will be correspondingly greater.

The LaGrange Hydraulic Gold Mining Company.—This company's property embraces an area of 3174 acres, and is located in Oregon Gulch, Junction City and Weaverville mining districts, Trinity county. It was purchased in the spring of 1893 by Fred Beaudry and Baron Ernest LaGrange of France. Ditches were extended and enlarged, building improvements multiplied and the entire system placed on a basis of magnificent proportions. The gold-bearing gravel was found to vary from a few feet to 400 feet in depth. This property is splendidly equipped with an extensive water system.

A canal has been constructed from Rush creek, 14½ miles, having five tunnels, aggregating 2118 feet in length. These tunnels have a grade of three-fourths to one inch to the rod, and some of them are heavily timbered almost their entire length, while about seven-eighths of the ditch is in rock. These water courses are 7 feet on top, 4½ at the bottom, 4 deep, grade 14½ feet to the mile, and carry 3000 miners' inches, or 60 cubic feet of water per second. To avoid four miles of expensive rock work, a pipe-line was put down 1681 feet in length, 18 inches in diameter, with depressions of 355 feet.

At West Weaver a pipe-line was installed, 2224 feet in length, 28 inches in diameter, with a fall of 150 feet, and depression 450 feet below this discharge. Water rights acquired by this company are very valuable. The main canal is 14½ miles in length, with a capacity of 4000 inches; upper Loveridge ditch, 4 miles, capacity 1500 inches; lower Loveridge ditch, 1¾ miles, capacity 600 inches; with five or six of minor importance, making the aggregate about 23 miles, with capacity of 7000 inches. The waters are taken from Rush, West Weaver and other creeks.

To increase the volume of water, Rush creek and Stewart's fork are being connected by tunnel through the mountain, 9000 feet in length, 5x7 feet dimensions, passing under the comb of the mountain at a depth of over 3000 feet. Power drills are now working from both sides. To bring the water from Stewart's fork into the mouth of the tunnel 8000 feet of flume had to be constructed on that side. Several thousand feet of the tunnel are already completed, and the work is being pushed day and night. At present the available water supply is from Rush creek, and amounts to 3000 inches, under a head of 250 to 450 feet, delivered through three giants, with nozzles from 6 to 9 inches in diameter, and 18-inch inlet.

At the top of Table mountain a large reservoir has been constructed, supplied by the canal system, from which pipes radiate to the various giants, 15, 18 and 22 inches in diameter, and under various heads. The mine is equipped with a top sluice 108 feet in length, 6 feet wide, 3 deep, with a grade of 8 inches to 12 feet, paved with block riffles 16x16½, 11x13, 13x13, followed by ground sluices 100 feet long. Still below are forty-three boxes, 12 feet each, paved with block and stone riffles. At the end of the main sluice is a chute with right and left undercurrent, one 18x48, the other 24x36, paved with rock riffles. Grade of upper sluice is 8 to 12 inches to the box of 12 feet. The larger intervening boulders are handled by derrick.

Electric plant, telephone and telegraph systems and other improved features are in the equipment. In the mine 9000 feet of sheet iron and steel pipe are in use. The tailings are dumped into Oregon gulch, which discharges into Trinity river, above Junction City.

This company is incorporated under the laws of Colorado, with W. H. Radford as superintendent. The property is producing $1000 net per day of 24 hours. But, with the increased water supply and the additional improvements being made, the company will soon be prepared to greatly increase the gold output. W. S. Louden & Son were the engineers in charge during the preliminary stages of its development.

The French Hydraulic Gold Mining Company.—This enterprise is located at Junction City, ten miles from Weaverville, the county seat of Trinity county. The property was purchased by Mr. Beaudry of Dr. A. H. Hayes, of Boston, June 23, 1893, and January 20, 1894, the present company took possession. Its area is 1800 acres, and the company is still acquiring more territory. The property was mined for years in a rude and limited way by some of the early Californians. It lies on the west side of Trinity river. Operations at present are mostly confined to the McKinney and Picket claims, which are extensively equipped with pipe lines, sluices, ditches, flumes, giants, etc. These gravel deposits are terraced, the lower 80, the upper 100 feet in depth, 1000 to 3000 feet in width, extending along the west bank of Trinity river for a distance of three miles.

The main ditch taps Canyon creek, is twelve miles in length and has a capacity of 3000 miners' inches. It is 7½ feet at the top, 4½ on the bottom, 4 feet deep, and the flumes are 4x6 feet, with 2-inch bottoms, 1½-inch sides, and grade 10 feet to the mile. At Butler's Divide a syphon 35 inches in diameter and 2214 feet in length is in use. Water is conveyed by the ditch system to a penstock, thence by a large pipe-line to the river. At this point a suspension bridge 516 feet in length spans Trinity river, along which the large pipe-line extends to the opposite side, thence to the works where the water is utilized. The span is 335 feet, cables 4½ inches in diameter, weight of each 33,000 pounds, fastened at the ends by tunneling into the rock, with iron stanchions firmly cemented in the solid granite. In this work about 4500 feet of 15, 18 and 26-inch pipe were used. Twelve miles above the head of the ditch the company has secured the right to the water of a lake, the source of Canyon creek, in the Granite mountains, at an altitude of 5600 feet. It has an area of 160 acres and is of unknown depth. The fall in these diggings from the penstock to bedrock is 400 feet, working pressure 225, using No. 7 to 14 iron. Several bedrock drains in the McKinney claim are from 20 to 35 feet in depth, blasted in the clay slates. The bedrock formation is a dark slate, with streaks of quartz and bands of porphyry. No. 2 flume is 1000 feet in length, 4½ feet wide, with grade 5½ inches to 12 feet, and paved with block riffles 10x15½. No. 3 flume is 840 feet in length, 4½ feet wide, grade 8 inches to the box of 12 feet, and paved with block riffles 12x12. Dump from the end of No. 2 is 100 feet above the river; from No. 3, 95 feet—thus affording ample fall for tailings and room for the establishment of undercurrents.

Ten giants are operated on the property, so arranged as to perform the greatest possible execution. A bedrock tunnel has been run on the southeast end of the claim 260 feet; from the breast an incline of 30, and an upraise of 55. The tunnel contains sluices 5½ feet in the clear, with block riffles 12x12.

Operations on the Picket claim are more limited, and the water is taken from McKinney and Mill gulches. The ground being worked is the first, or lower, bench, and the characteristics are about the same as adjoining properties. The works consist of a flume 400 feet in length, 4 feet wide, 6-inch grade, with block riffles 10x15. The necessary pipe-liae is 600 feet of 15-inch No. 7 iron.

Edward Cumenge is president of the company and chief engineer of the LaGrange. The general management of this property is in the hands of E. Saladin. Mr. Beaudry is local administrator, while the main office is in Paris.

The Minersville Hydraulic Gold Mines.—Minersville is eighteen miles from Weaverville, on the east fork of Stewart's fork of Trinity river and 2300 feet above the Pacific. In August, 1894, Fred Beaudry purchased a lot of these placer grounds and began active operations on them. The various consolidations aggregated 2800 acres, including the town of Minersville, which he also owns. Since taking possession he has constructed a system of ditches, the principal one of which is nine miles in length, taps the east fork of Stewart's fork, has a capacity of 5000 miners' inches, is 9 feet wide at the top, 6 at the bottom, with an average grade of 15 feet to the mile, and in places it is lined with 1½ to 2-inch planking. Waste gates and flumes are of 2-inch lumber, with 4-foot sides and 6 feet on the bottom. Length of main canal and laterals, 16 miles,

On the property are fine bodies of sugar pine, cedar and spruce, with a sawmill for cutting them into lumber. Over 4000 feet of sheet iron and piping have been laid, 15, 18 and 22-inch, with four giants under a pressure of 350 feet. Seven miles of roads have been constructed, and upon the property is one of the largest giants in the world. Its weight is nearly 4000 pounds, discharge pipe 16½ feet in length and inlet 18 inches. The property is in fine shape and is yielding lucrative dividends. Like the Junction City placers, these gravel bars are in benches. The gold is coarse.

Siskiyou Hydraulic Gold Mines.—On the south fork of Scott river Mr. Beaudry has purchased 974 acres of placer ground and is equipping the tract for extensive operations. The territory is on the Klamath river drainage, and the headwaters are several deep lakes, varying from 20 to 160 acres each. There are two ditches on the property—one from Boulder creek, with capacity of 1500 inches, and the other from Fox creek, of 7000 inches. Boulder and Fox lakes can be utilized, thus greatly increasing the volume at nominal expense.

From three acres of the old diggings at this point $170,000 were taken. The gravel has been thoroughly prospected. Along the river is virgin territory which prospects well. It is 200 to 600 feet in width, 7 to 20 feet deep, and full length of the claim—9500 feet. On the mine are 2000 feet of 11 and 15-inch pipe, several giants and other improvements. Pressure of the Fox ditch, 300 feet. Ditches, flumes, pipe-lines, sawmills, electric plant, roads and various other improvements are in course of construction.

The Beaudry Hydraulic Gold Mines.—On Wild Cat creek Mr. Beaudry has purchased 1810 acres of gold-bearing gravel bars, a short distance from the other Siskiyou properties. This mine has an average width of about 5000 feet, is over 9000 feet in length, and the auriferous gravel is from a few feet to 100 in depth. Along the streams and on the sides of the hills, ridges and mountain slopes, gold in paying quantities is found. By extending the ditch already completed to Grizzly gulch on to Jackson creek, an ample volume of water would be the result for extensive hydraulic purposes on the mine. This could be accomplished by the extension of the Grizzly creek ditch a distance of about 8000 feet.

C. L. HALL, M. E.

Railways and Mining.

British Columbia is fortunate in having the advantages of lively railroad competition. Without it the great mines of the Kootenay country would yet be only prospects awaiting development, for only a small proportion of the ores could be shipped to smelters without reasonable rates. Probably the best indication of the value of the mineral resources of the country is the fact that the competing railroads are at great expense pushing their branches into it. Contractors are building a line from Trail to Robson; the Great Northern expects to build a branch from Bonner's Ferry to Nelson; an application is out for a charter for a road from Lethbridge, Northwest Territory, to the Fraser river or the Gulf of Georgia; it is probable that the Canadian Pacific will build a number of branch lines into British Columbia to hold trade, and a gang of men is clearing the right of way for the Slocan river branch of the Columbia & Kootenay Railway, and another gang is clearing the right of way for the C. P. R. road between Slocan crossing and Slocan lake.

Mining Summary.

CALIFORNIA.

Amador.

Ledger: The Black Prince, at Ione, has been bonded by Geo. Walker for thirty days to Cutting & Jordan, the lessees. They are putting up machinery to work this and the Leoni mine.

The Union Consolidated at Clinton, at the depth of 400 feet, has made a rich strike. The ledge is 16 feet wide, of free milling quartz, and is expected to average $10 a ton. The shaft was continued deeper, and, at 480 feet, struck a rich body of galena rock. The owners are continuing to sink the shaft to yet greater depths. They have a 30-stamp mill and contemplate increasing its capacity.

At the Bellweather property, owned chiefly in Chicago and located at Jackson, they have just completed a crosscut from 282 feet in depth, 130 feet east, the last 50 feet being in ledge matter which assays well. Sinking is being prosecuted steadily, the shaft now being about 320 feet in depth.

Fisher & Thompson of Stockton have bonded the ledge on the Mullen property, on Mule creek, near Ione.

Butte.

Register: On Magalia ridge, in the Peter Woods mine, owned by the English syndicate, eighteen men are employed under the supervision of E. C. Paxton.

In the same vicinity, the Ethel gold mine, owned by a New York syndicate, of which Prof. Thomas Price is the general manager and W. D. Edward superintendent, twelve men are employed.

In the Princess mine ten men are employed under Superintendent Geo. E. Hogg. It is reported that an excellent quartz ledge has been struck in this gravel mine.

In the Bader mine, of which Geo. B. Mowry is superintendent, three shifts are employed, and the gravel is paying well. The tunnel is now in 1500 feet.

In the big Magalia mine there are forty-five men at work.

On the John Dix mine, which is owned by R. Diller of Chico, six men are employed, and it is reported that the gravel pays well.

D. A. Metheson, near Nimshew, is running an open cut on his quartz mine and uncovering the ledge, which crops out for a long distance. This is what in former years was known as the old Meredith ledge. Mr. Matheson will probably in the spring erect a quartz mill upon his property.

Calaveras.

Prospect: The Sterling brothers have pumped the water out of the Wide West mine. The shaft is down about 180 feet, with two drifts at the bottom, out of which good rock has been taken. The ledge averages from 10 to 18 inches.

Thomas H. Jenkins, on Skull Flat, has cleaned out an old tunnel on a claim above the Barnhardt ranch. The tunnel was worked in early days. After clearing out about 200 feet of old driftings he uncovered a vein of ore avering from 12 to 18 inches wide that will prospect very high, is free milling, and carries a nice looking high grade of sulphurets.

El Dorado.

(Special Correspondence).—Scuppon & Alexander are prospecting on the old Moses Miller mine, three miles south of town. Their tunnel is in 65 feet. The ore body is 5 feet, and averages $6 per ton. The ore is milled at the Larkin mine. The sulphurets run 2 per cent and average over $200 per ton.

McCue & McPherson are opening a large gravel property on the Bennet ranch, twelve miles west of town.

Prospectors have uncovered an unusually large ledge on the north side of the American river, four miles north from here. The property belongs to a Mr. Hartman of San Francisco.

Seymour & Staver are doing systematic development work on the old Vandalia property, thirteen miles southwest of here. They have completed over 400 feet of underground work. The mineral-bearing ore is said to be similar to the Utica holdings—quartzite, amphybolite schist and soda spar. The young men are working vigorously and with success.

It is reliably reported that Ballard & Martin will begin work on the old Superior, or Tincup mine, three miles south of town, early in the spring. This was a richly-paying property ten years ago. The old 10-stamp mill still remains upon the property in a fair state of preservation. The greatest depth attained when this plant was operated was 155 feet.

J. T. McNutt started development work on a 12-inch cropping. The shaft is now down 25 feet on a 24-inch ledge of good ore in a slate formation. The property is thirteen miles southwest of Placerville, near the Big Canyon mine. It is called the Rockefeller.

Placerville, Feb. 1st, '97.

Gazette: At the Ohio mine, about one-half a mile from Greenwood, they are at present working a force of ten men night and day. The shaft is 300 feet deep and they are taking good ore from the bottom of the shaft; the quartz has a good showing of gold, and there are prospects of a mill in the near future. This mine is bonded by San Francisco parties.

At the Welch mine, north of the Ohio, they are sinking a shaft and are now down about 150 feet. They intend going down much farther, as their prospects are good.

At the Garibaldi mine, owned by San Francisco people, the tunnel is between 300 and 400 feet and the ledge is 8 feet wide, the ore found assaying at $8 per ton.

The owners of the Lucky Marian intend placing machinery on the mine and a 20-stamp mill be erected which will be in position to resume work this month. The shaft is 110 feet deep; the ledge in south drift is 19 feet 6 inches in width.

Hickman and Stevenson are working the southern extension of the Lucky Marian and have started to sink a shaft.

The Walker mine has been bonded to parties in San Francisco. There is a 5-stamp mill on the property and good work is being done.

Kern.

Johannesburg *News*: W. D. Sollender has sold to Rogers, Pepper & Allen, the owners of the Wedge mine, the Gold Mountain group of mines, situated one mile east of Johannesburg, which contains thirteen claims and lies on the west slope of the mountain. A big force of men has been put to work and more will be added as fast as room is made for them. The new company purpose erecting a mill as soon as development justifies it.

The Standard mine, lying west of the Little Butte and Kenyon mines, has beed sold to A. C. Harper of the Harper-Reynolds Company of Los Angeles. A force of men has been put to work developing the claim.

Nevada.

Union: Some rich ore has been uncovered in the Pocahontas mine at Gold Flat. The ledge is a good-sized one and there is every indication that the pay streak will continue as depth is attained. In past years ore yielding as high as $105 per ton has been taken out, but the mine has never been worked below the water level.

Placer.

Argus: The California Debris Commission has received an application from G. D. Duncan & Co. to mine by the hydraulic process in the Pebble Bottom mine, near Yankee Jims.

Johnson, Graber & Dyer are putting up a Huntington mill on the old Gayetty ledge, on the Bear river slope.

Herald: At the Red Point sixty men are employed. The old channel is being followed and they are in over 10,000 feet, the prospects continuing good. This mine is operated by a French company whose interests are looked after by J. A. Ferguson.

The Morning Star mine at Iowa Hill continues to be one of the most steady paying properties in that section. A dividend of $6 per share was recently declared.

The Big Dipper mine near Iowa Hill is in active operation and is a good producer.

The mining operations in the vicinity of Michigan Bluff are at somewhat of a standstill owing to the lack of water, but after the first heavy rain work will be vigorously prosecuted.

The old Evening Star mine on the James Heenan ranch, on Rock creek, has been opened up by a San Francisco company. About fifteen men have been engaged the past two weeks in cleaning out the old shaft, and when the drifts are reached as many more men will be employed. The Evening Star is a good property, and a good deal of money was taken out of it in early days.

Since the Dam mine was purchased by the Hidden Treasure Company, Centerville, where it is located, has become an important point, and when active operations begin in the spring it will be one of the liveliest camps in the mountains, owing to the large number employed about the mine.

The Hidden Treasure at Sunny South continues a steady producer, although only a comparatively small force is now employed.

Work at the Mountain Gate mine is being carried on with speed, the tunnel now being opened a distance of 5000 feet, and they are crosscutting for solid gravel. This property is owned by the Hidden Treasure Company.

About sixty men are employed at the Pioneer mine under the management of D. J. Sullivan. A shaft is being sunk from the 500 to the 1000-foot level, and the mill is kept running steadily night and day. Tunnel No. 4 is now in 2200 feet, and they will have to go in 500 feet more to reach the vein. Power drills are kept in constant operation, and 10½ feet a day is made. The company recently purchased four other claims adjoining their own property and ore is being taken out and milled at the Pioneer, and thus far with good results. This mine is owned by a Boston company.

Riverside.

Independent: Work has been suspended on the Golden Chariot mine, near Perris.

The St. Elmo people have opened up another extensive body of rich gold in a drift about 250 feet from the main shaft.

The Jumbo Mining Company are now operating the Santa Fe mill, near Perris.

The upper shaft in the old Santa Rosa mine, near Perris, has reached a depth of 254 feet, and thirty men are employed. The drifts from the new shaft are within 15 feet of those of the old shaft, and 25 tons of ore are extracted daily and milled at a good profit.

Twenty men are now employed on the level in the Good Hope mine, Perris, where the rich strike was made last week. The ore body is holding its size and richness. The superintendent says the stamp mill will be started shortly.

Shasta.

Searchlight: Dr. O. H. Simons has held a bond on the Balakalala for some time. This bond has recently been assigned to Alex. Hill, manager of the Mountain Copper Company, who will thoroughly explore the ore body, and, if he finds it satisfactory, the expenditure of large sums of money in railroad and increased reduction capacity is assured. The Balakalala group is composed of about forty claims, and, like the Iron Mountain, is a large mass of sulphide ore. The property is located about four miles northeast of Iron mountain.

It is reported that a sale is pending of the Texas Consolidated at Old Diggings, R. G. Hart, Sr., owner. This property is the largest quartz mine in operation in northern California and is developed to a depth of 1100 feet; it is equipped with a 20-stamp mill and a complete plant for saving and chlorination sulphurets. Electric power is used in the mill and an electric hoist is now being placed in the tunnel No. 5 to take the place of a gasoline hoist heretofore used.

D. Hunt, who has charge of Senator Jones' interests in Shasta county, has a force of men employed running a 500-foot tunnel on the Ballou mine on South Fork.

W. H. Goulet, a leaser on Deadwood, has struck a rich find in the upper works of the Last Chance ledge.

The Ancient Channel drift mine of Delta, which has been idle for some time, will shortly resume operations.

Chas. Butters will inspect his interests in Shasta county this week. It is said on good authority that his visit will probably result in extensive development work in the neighborhood of Kennett.

Free Press: The demand for siliceous ores is increasing through the operations of the Mountain Copper Company. This fact is giving an impetus to mining and prospecting within a range of several miles from Keswick and Redding. A home market has been created for a marketable ore product, and the industrious miner, who is able and willing to work, may, with small capital, except his muscle, make a living. At present the demand for silicious ores is greater than the suppiy, and the company have taken hold of several properties which they are developing at their own expense.

While the Uncle Sam mine on Squaw creek is worked out, yet there are about a dozen of the old hands with their families living there and making good wages with leases from the company.

The Princess Hydraulic Mining Company have completed their long ditch from Boulder creek to Horsetown, a distance of eleven miles. The water has been turned in and they have started the giant in the mine at Horsetown.

Siskiyou.

S. J. Fore, of the Last Chance mine, near Callahan's, has purchased an Evans' elevator, which is capable of hoisting 200 tons of gravel per hour. Everything is in shape to operate the mine on an extensive scale. Last Monday Mr. Fore placed thirty additional names on the pay-roll.

Journal: Grayson and Hunter, who have bonded the Blue Gravel mine at Greenhorn, are sinking a shaft to strike the gravel bed lower down the creek and then work up to the old shaft.

Prospectors are locating new claims everywhere in the county to commence work for the spring season, and companies are being formed to work old claims on a more extensive scale.

Several quartz ledges will be worked during the coming summer that have been idle on account of the ledges pinching out. It is the intention to explore for the lost ledges by going down deeper and running crosscuts.

Journal: The Blue Gravel mine, near this place, will be reopened in the course of thirty days by San Francisco parties brought here by H. H. Hunter, who will retain an interest in the property.

Several big mining deals are about consummated in the county, among them being the construction of a flume to cover the high bars below the pumping plant on Shasta river. These bars are known to be very rich, good wages being made by wheeling the gravel four hundred yards to the river and rocking it.

News: Charles Bienbaum is running a tunnel on the Jasmund mine in Humbug district. It is a well-defined ledge and can be traced for 2000 feet.

There will be some extensive improvements made at the Jumbo mine in the spring, including a cable tramway, a wagon road and some additional improvements in the mill which will be started after the tramway is completed.

Work is progressing on the 400-foot level in the Brown Bear, at the head of White's gulch. The vein was reached in 240 feet by a crosscut tunnel which was extended some 200 feet past the ledge, but the work now being done is drifting on the vein.

Trinity.

Journal: At the Sybil group of mines near Deadwood there are sixteen men employed. There is enough ore of good quality in sight to run the mill steadily.

At the Bloss & McClary mine the company are piping night and day. On piping off a slide from the mountain a good deposit of gravel was found lately.

G. L. Carr has made a new strike in his mine near Carrville. He ran in a prospecting tunnel and then raised, striking the ledge in two places.

On Coffee creek the Trinity Gold Placer Mining Syndicate are running their bedrock tunnel for the purpose of getting dump and will have it completed by spring. They will then be ready to operate their rich placer mine on a large scale.

There are large deposits of gravel at Trinity Center and vicinity, along Coffee creek, on Dutton's creek, or Indian creek, around Weaverville, at Junction City, Canyon creek, Rattlesnake, Minersville and along the Trinity river, which have not been worked to any extent owing to the expense of bringing on water.

At Hay Fork considerable work is being done in the mines. Duncan and Pragmore on Morgan gulch are taking out ore and have struck a large body of rich rock.

B. Kellogg is working two men on his ledge on Kingsbury gulch and is taking out ore.

W. C. Drinkwater is running his placer mine with good results.

Quite a number of men are working with sluices and rockers in Kingsbury gulch.

Tuolumne.

Union-Democrat: The mines around Yankee Hill are showing up well. The Silver Queen, owned by Geo. Mapes, is being steadily worked.

The Wood's Creek mine, in the vicinity of the Silver Queen, is showing a large and rich vein. It has attained a depth of 120 feet, and drifting is being done.

Work on the shaft of the No. 1 mine at Stent is being pushed forward, and Jimes McGinn, the owner, expects to develop a good body of ore as soon as a contact with the vein proper is effected.

Mother Lode Magnet: The mill at the Shawmut mine is nearing completion, and the mine will be in operation within the next two weeks.

The Confidence mine, which had been running from ten to twenty-five stamps at regular intervals, started up the full complement—thirty—last week. There is a large quantity of ore on the dump, and the mine is said to look better than ever. The company employs forty-three men.

There is some work being done on the Green mine. It is the intention of the management to begin work on an extensive scale as soon as the condition of the roads will permit.

Mother Lode: It is reported that the App will erect forty additional stamps this coming season.

The Old Bonanza mine, within the city limits of Sonora, and from which several of the present leading citizens of the county secured their fortunes, is to be reopened, after having been shut down and abandoned for years. Owing to the pockety nature of the ledge matter, the mine has never heretofore been worked systematically as a milling proposition, and it was through losing the rich pay streak that the old claim was abandoned.

The California Exploration Company, which recently purchased the Bellevue mine, have closed down the mill. It is the intention to expend $100,000 on development work, that the mine may be properly opened up.

John Dingle and associates of Sonora have bonded the Mullen mine, six miles east of Sonora, to a San Francisco syndicate. The new company will at once commence the sinking of a new shaft.

The new chlorination works, of three tons capacity, at the Star mine, are completed and giving good results. Ten stamps are dropping steadily on ore from the mine.

NEVADA.

Surveyor General Pratt of Nevada, in his biennial report, says that in the western and southwestern portions of the State, where formerly was produced the bulk of Nevada's silver, gold mining is experiencing as much of a revival as elsewhere. In Esmeralda county the Silver Star mines are paying their owners a good profit, and Silver Peak is proving to be a good gold-producing camp. The Big Indian, Marietta, Mt. Grant and Hawthorne district mines all make a good showing.

The bullion product of Nevada, according to statistics furnished by the Superintendent of the Mint, for 1895 was:

Gold	$1,780,204
Silver	1,051,992
Total	$2,832,196

For 1896:

Gold	$2,955,140
Silver	998,555
Total	$3,953,695

This shows a gain for 1896 of $1,121,499, due principally to the output of the counties of Lincoln, Esmeralda and Elko.

Dayton *Times*: Considerable work has been done on the Logan and Hulley mine, in Como district, this winter, and a great deal of ground has been opened up. At present five men are at work on a lower tunnel. There is low-grade ore enough in sight in the mine to keep a 10-stamp mill running for years.

Enterprise: A new ore body has been uncovered on the property of the Golden Eagle Mining Company, in Humboldt county. As soon as the new working tunnel is completed, the Board of Directors will meet to arrange for a mill with which to handle the ores that are now being blocked out.

On the Ophir group, the development of which is being prompted by the same gentlemen, the tunnel is being pushed ahead with two shifts.

The owners of the Blackbird, which has been productive of some high-grade ore in the past, have resumed work. The mine was closed down about two years ago. The mill, which has been idle since, will be started up in April, with abundant ore on which to run.

Gold Creek *News*: There are three important works now going on that will do much toward determining the extent and value of the ledges in this camp. At a depth of 50 feet the Snow Flake shaft has passed through the hard hanging wall and has disclosed the side of an ore body for nearly 7 feet. The quartz is plentifully sprinkled with free gold, but no tests have yet been made. The Blue Ridge tunnel is in 150 feet and is now in granite and quartzite. Stringers of quartz have been found all along that may carry gold, but nothing big is expected until the main dike is reached. The Mother Lode tunnel is in 180 feet and as the slate and porphyry in the face break easily, 5 and 6 feet every twenty-four hours is being made. The two tunnels on the Mother Lode and Blue Ridge groups and the Snow Flake shaft were started at about the same time. These are widely separated.

J. H. Robbins has located 480 acres of placer ground on Beaver creek for himself and C. A. Watkins. Beaver creek is six miles southeast of Gold creek and its waters are drained into the sink of the great basin.

Gold Creek *News*: Machinery has been ordered in San Francisco and hydraulicking at the Gold creek mines will commence April 1st. The work will begin near the head of Hope gulch, and four giants will be started about that time. Some 5000 feet of pipe will be laid. It is expected to install a plant that will eventually work from 40,000 to 45,000 cubic yards of gravel a day.

Walker Lake *Bulletin*: At Silver Peak the

dumps of the Western Soldier and Drinkwater mines are full of ore.

Work on the Mary tunnel is being pushed night and day, and there has been a favorable change in the face during the last few days. It is in nearly 800 feet and is about 500 feet below the surface.

In Alida valley they are still taking out rich ore from the Suwana mine.

Reese River *Reveille*: T. J. Bell's placer claims at Ione are producing more gold than ever. Several other valuable discoveries have been made of late.

OREGON.

Baker City *Democrat*: E. M. Hand has finished an examination of the Columbian mine in the Virtue district, controlled by W. G. Press of Chicago. Mr. Hand found that the vein averaged over $15 to the ton in gold, and averaged over 3¼ feet in width, while the west drift, which is in 75 feet, showed the same average in value and width of vein at the 175-foot level. A steam hoist is to be placed upon the property at once and development pushed. A 10-stamp mill will be erected upon the property in the spring.

Medford *Mail*: All the placer mines along Evans and Saxe creeks are in full operation with plenty of water.

The Brooks placer mine is running in full blast with good supply of water.

F. McComb and H. Oden are mining a placer mine, below the mouth of Saxe creek, with a big head of water.

Jacksonville *Democratic Times*: The Linchpin mine in Wagner creek district has developed a body of good sulphuret ore, 7 feet wide, at a depth of 114 feet.

Philips & Strong of Waldo district are building a long line of 3-foot flume for an outlet.

Morris & Smith, who bought the Polk Dews mine on the Palmer creek some time since, one day last week picked up a $27 nugget.

Gold Hill *News*: Kane creek, near Gold Hill, is under bond to Boston men. They will take water (5000 inches) from Bear creek. This will require a ditch thirty miles in length, which will give them 400 feet fall at the head of Kane creek.

The old Gold Hill mine, said to have produced a large sum from a pocket in early days, is being developed by a crosscut tunnel, cutting the ledge at a depth of about 250 feet.

Dr. Braden will start his quart mines and mill next week.

J. Beaman is taking considerable ore out of the Ritter and will start his mill shortly.

Parties are negotiating for the Sardine creek placer fields. This is a very extensive gravel deposit.

A number of small placer mines are operated around Gold Hill. With a high line ditch southern Oregon would produce several millions in gold every year.

The Black Channel, on Foots creek, is being put in working order. Large reservoirs, flumes, etc., are being built.

BRITISH COLUMBIA.

Spokesman-Review: In the Kettle river district the owners of the Pathfinder are negotiating for a sale to Montreal and Toronto parties. Should the deal fail, there is a large English syndicate anxious to get hold of the property, and who propose the erection of reduction works as soon as practicable.

A half interest in the Golden Crown, in Wellington Camp, about half way between Grand Forks and Boundary creek, has been sold to T. M. Daly for $15,000.

The Ruth mine in the Slocan, which recently came into the hands of Mr. Forster of London and George Alexander of Kaslo, is shipping about 600 tons of ore monthly.

At the Noble Five there are about 10,000 tons of ore on the dump, all of which has been taken out in course of development. The new concentrator is of 120 tons capacity. The mill was started up about a week ago. By May 1 the mine will be opened up to a depth of 1000 feet.

Negotiations are pending for the sale of the Alamo, Cumberland, Slocan mill and tramway and the Idaho mine, all in the Slocan district, to an English syndicate at a price approximating $750,000. The Idaho has already paid in dividends to its owners the sum of $125,000, and is paying a dividend of $20,000 monthly.

The Payne mine is now shipping sixty tons of ore a day. It is said that the ore will run anywhere from 250 to 400 ounces in silver to the ton. The monthly smelter returns will approximate $150,000.

Superintendent Hall of the LeRoi writes that they have struck a new body of ore in the face of the west drift of the 500-foot level, west of the main cross course. They are now shipping 150 tons of ore daily.

Spokane *Chronicle*: D. E. and W. H. McVay have sold their interests in the Ruth mine, near Sandon, B. C., for about $75,000 to people who represent an English syndicate that recently purchased the two-thirds interest in the same mine for $166,666.

The Vancouver *News-Advertiser* says 356 mineral claims were recorded in Kamloops district during the past year.

The yield of gold from the placer mines on the Thompson and Fraser rivers, within the Yale division, amounted to $61,608.

In the Similkameen division the yield of gold amounted to $9000 and of platinum to $750.

Nelson *Miner*: There are at present 863 men employed in the Slocan mines. At the customary wages of $3.50 a day the total daily pay-roll of the district thus amounts to over $3000.

The number of claims staked in this district and recorded at New Denver since 1891 is as follows:

1891	119	1895	638
1892	633	1896	1,085
1893	398		
1894	270	Total	3,143

The Transfer group, between Dayton and Springer creek, has been bonded to W. A. Campbell of Rossland for $20,000.

Work has been commenced on the Skylark and Ranger claims, situated on Dayton creek. These claims are bonded to Mr. Dick of Nova Scotia.

The Rover, on Ten Mile creek, was sold last week to the Carnduff Mining Company at a good figure. This company has now interests in thirteen claims in the district.

J. A. Thompson of Carnduff, N. W. T., last week bought from G. M. Sorelle a quarter interest in the North Extension, Pay Roll and Quadra Fraction, on Dayton creek, adjoining the Exchange, now under bond to R. C. Campbell-Johnstone.

The following is a statement of the ore smelted by the Hall mines smelter during the past year:

	Value.
Gold (575.30 ounces)	$ 11,901
Silver (628,124 8 ounces)	430,843
Copper (2,247,192 pounds)	22,171
Total	$454,908

The ore smelted amounted to 60,262,405 pounds, 59,720,335 pounds being from the Silver King and 542,070 pounds being from outside mines, and 4,775,335 pounds of matte was produced.

Average price of gold per ounce, $20; silver, 67 cents; copper, 10 cents per pound.

Spokane *Chronicle*: The Alpha and Black Bear mines near Sandon have been sold for $75,000 to English parties.

The Kootenay-Columbia tunnel has at a distance of 400 feet opened a large body of high-grade ore, averaging about $30 in gold.

A strike of six inches of ore assaying 390 ounces of silver has been made in the Cordelia in the Slocan.

A. Dick has bonded the Skylark and Ranger on Dayton creek for $10,000.

Mr. Heinze has secured enough ore to warrant him going ahead and enlarging the capacity of his smelter by the addition of two furnaces which have been ordered for the treatment of Slocan ores.

Victoria *Times*: The Kootenay tunnel, which is now 400 feet long and 100 feet in on the Columbia ground, has opened up an 8-foot ore body. This is supposed to be the chute opened in the Columbia tunnel above, from which shipments were made last year which yielded over $50 to the ton.

The ore body found west of the main chute in the Le Roi now measures about 5 feet between the walls and assays about $40 in gold and ten per cent in copper. This is the highest grade ore in copper ever found in the mine.

A double compartment shaft is being sunk from No. 2 tunnel of the War Eagle and is yielding large assays since the new owners resumed work.

According to the weekly reports of the Rossland *Miner* there are now nine regularly shipping mines in the camp.

New Denver *Ledge*: Thirty more men have been put to work on the Reco.

The $40,000 bond on the Skylark and Ranger, Dayton creek, made by A. Dick, has been signed.

A strike of cube galena was made in the Wakefield last week. Some ore soon to be shipped from this property will return a profit of over $100 to the ton.

C. K. Hammond, acting for the Ramsdall Mining Company, of Tacoma, has bonded the Sapphire and Gem on Payne mountain for $10,000, 15 per cent cash.

The Slocan Star is looking better than ever. Between two and three levels stoping is being pushed. The width of the ledge, and the way in which huge blocks of ore are blown down reminds the spectator of coal mining.

UTAH.

Eureka *Democrat*: The Homestake shaft is nearing the 300 level. The vein has left the shaft, but a crosscut to the ore body will be started from the 300.

The Buckeye is producing higt-grade ore, and regular shipments are being made.

The tunnel at the May Day is now in over 500 feet and will be run to the vein, which will probably be encountered in another hundred feet.

The experimental smelter at Mt. Nebo is not ready to start up, but a force of nine additional men have been put on the Star to take out ore.

Salt Lake *Tribune*: The Marion and Geyser have agreed to bury the hatchet and the two properties will probably soon be consolidated. The conflict between the Marion and Geyser has been over ground the ownership of which was claimed by the Geyser. It was also a matter of evidence that the territory in dispute was worth $750,000, and to acquire it a better fight has been waged. It is understood that in the compromise the two properties are consolidated. In that event the company becomes one of the strongest in Camp Floyd mining district. Each has a mill already erected. That on the Marion has a capacity for handling about sixty tons a day, which is now being put through, while the Marion, with its recent improvements, is handling an average of about 100 tons.

Eastern capitalists have secured a bond on the Yankee Girl at Silver City, and that the deal will be consummated is now practically assured.

At Mercur work at the Northern Light is progressing and the early starting of the mill is assured

The Golden Gate has a larger force of men at work now than at any previous time.

At the Little Pittsburg a good deal of exploration has been going on, and it is said there is a better showing than for some time past.

The Gold Dust has a great deal of ore in sight, and cinnabar is not lacking in the workings. That a large mill will be erected early in the spring is an assured thing.

Tintic *Miner*: There is a probability of the Swansea being obliged to shut down on account of the excessive charges for treatment of its ores now exacted by the smelters. These charges, we understand, have been advanced $7 per ton, which means, if shipments are continued, a loss of about $2500 to the Swansea Company.

The Bullion-Beck ore body on the 800 level is reported to be the richest in the history of the mine.

A contract will be let at once to sink another 100 feet in the Pocahontas. It is also stated that a steam hoist is a probability in the near future.

Capt. John A. Bard of the Silver Cloud reports that the shaft on that property is down 160 feet. It is proposed to put proper machinery on this property and to sink a deep shaft.

Jesse Knight states that the new tunnel on the Uncle Sam is now in 100 feet, and he has let another 200-foot contract.

The connection between the surface and the old shaft of the Mammoth mine has been made, and the mine will soon be able to greatly increase its output. The recent high-grade gold ore struck in the lower levels is reported to be holding out well.

IDAHO.

Murray *Sun*: The Golden Chest mill is to be closed down next week, and all the efforts of the company will be concentrated on development work. The upper levels of the Chest are practically worked out, and the company is not at present inclined to run a lower tunnel until some virgin ground on the old levels toward the Idaho line is prospected.

Wallace *Press*: The water is down to the 1100-foot level in the Tiger shaft. Men are being added to the force right along, and by the end of the week there will probably be 100 at work extracting ore. The pumps on the 1100-foot level were found to be out of order and retarded operations somewhat. The mill is giving entire satisfaction.

MONTANA.

Butte *Miner*: The Altoona Mining Company has found some good ore at a depth of 420 feet. About $100,000 has been spent on this property in the past eighteen months. It is thought probably that the great copper belt of Butte may dip in that direction and that a new mining district may be developed.

At this particular point it is thought that the Glengarry lead will be found at a depth of from 400 to 700 feet from the surface.

At a depth of 172 feet the Parrot Company found another stringer on the Hesperus lode claim, under lease and bond from James A. Murray. The stringer is similar to the one found near the surface and contains a great deal of zinc and a trace of copper.

The new Butte and Boston people will start in with a $1,000,000 in the treasury for development work. It is not at all unlikely that for the first two months the smelter will be allowed to remain under lease to the Boston and Montana people. Development work will be done in the mines of the company that are now in some cases only promising prospects. The capacity of the smelter owned by the company is 500 tons per day. If necessary ore can be taken out at once in sufficient quantities to supply the smelter, but the reserves now on hand would soon be exhausted. The developed mines of the company are the Grey Rock, 1,200 feet deep; the Blue Jay, 650 feet; the Silver Bow, 1,000 feet; the Snohomish, 450 feet and the Harrington Placer, 200 feet.

The Rarus mine, owned by F. A. Heinze, is turning out about 500 tons of ore a day.

The Anaconda Company, it is reported, has abandoned the Ground Squirrel mine after spending a great deal of money in exploration work. Some good ore was taken from the mine, but it was found near the surface and nothing was found at the greater depths.

SOUTH DAKOTA.

Black Hills *Times*: A bond and option has been given on a large group of mines situated on the Blacktail divide to a representative of the Leiter syndicate of Chicago, now operating in Cripple Creek, Col. The bond runs for ninety days, at which time the entire amount—$250,000—is to be paid. Among the properties in the deal is the Kicking Horse group, the price of which is $150,000.

The west drift on the Kicking Horse group of mines is now in 260 feet, which completes the contract. During the progress of the work eleven ore shoots were crosscut that carry an average value of $40 gold per ton.

During the past week several parties have been investigating the amount of ore now being produced from the mines and getting data as to the actual amount that could be produced if local facilities were at hand to treat it. The probability is that the parties who have made the examination will report favorably, and the result will be that a custom plant of large capacity will be erected this season.

WYOMING.

Considerable excitement prevails at Sundance over the discovery at Bear lake of a gold ore lead which assays high values. People are flocking to the scene of the discovery, and over 100 claims have been taken up. The formation is said to be the same as that at the now celebrated Ragged Top mines.

COLORADO.

Aspen *Tribune*: Extensive development work is projected on the Park Regent mine, and, among other things, the big incline on the property will be extended an additional 100 feet. Of late some above average ore has been taken from the Regent, both by leasers and company men.

The monster pump station at the foot of the main shaft on the Free Silver mine has been completed and is now being timbered.

It is semi-officially stated that within the next sixty days the Deep Shaft will be started up.

Cripple Creek *Mail*: The Doctor mine on Raven hill is now sending out thirty tons of cyanide ore per day, besides the weekly output of seventy-five tons of high-grade smelting ore.

The Good Will tunnel compressor has been erected, and a contract has been let to drive 500 feet. European capitalists have subscribed $50,000 for this tunnel.

Work will be resumed on the first of next month at the Ross & Hurd tunnel, which enters Raven hill from the east and is running toward the Elkton vein. The bore is in 700 feet and has cut five veins, but none of them has been prospected.

There are forty men now employed at the Vindicator, doing mostly development work.

In the eighth level of the Victor a large vein of ore was opened up a few days ago. The tonnage for January will exceed 1500 tons. A shipment of $162,000 last month will be more than equaled this month. Saturday night 109 cars were hoisted for the different levels, large quantities of which are high grade.

The new pump of the Lucetta shaft, one of the Golconda Company's properties, has been started. It has a capacity of 1800 gallons an hour.

The Christmas for the week ending January 23rd beat all its previous records. A new stope is being opened at the 200-foot level, where 10 feet of good ore is in sight. It shows free gold and sylvanite.

Garfield-Grouse lessees are working a big force of miners. The output now is at the rate of 300 tons a month.

Returns received from the Vandenburg lease on the Jack Pot give a value of $118 per ton on the low grade and $727 per ton on the high grade. The consignment consisted of twelve tons.

Mining Record: At the Breckenridge gold belt heavy and regular shipments of smelting ore are being made and the gold output of the mines is constantly increasing. The developments of the past year have proven that the blanket veins of Yuba Dam flats are lasting.

A. H. Boyd, lessee of the Sultana, is making regular shipments of from 100 to 200 tons per month of smelting ore. The majority of the shipments are iron and sulphide, carrying gold and silver.

At Cripple Creek there are 150 paying mines, from 41 of which there were shipped last year 111,100 tons of ore, at a valuation of $7,540,600, or an average of $68 per ton.

Eighteen good strikes have been made around Cripple Creek since New Year's day. The mills and samplers are all running to their fullest capacity. The output of ore for the month of January, 1897, will equal, if not exceed, any month of the year 1896.

NEW MEXICO.

Silver City *Enterprise*: The Treasure Mining Company, a Denver organization under the general management of S. S. Murply, employs fifty men and is making the property pay well. Last week the work of cleaning out and draining the old Deep Down property, was commenced.

Spiller & McLean are working eight men on the Pacific Gold Company's claim on the Pacific vein.

The Golden Giant Company has thirty-five men employed at the mine and mill.

W. C. Chandler is working eighteen men on the Mountain Key on the 100, 200 and 300-foot levels.

There is considerable stir about the old copper properties in the vicinity of Paschel and Whitewater. At Paschel Thomas Kuncky is working six men and making regular shipments to the reduction works. Between Paschal and Whitewater James Woodward recently started work on ten different claims.

Bell and Paul are going to erect a small smelting plant upon the old Doyle claims, between Apache and Rector's Camp, which they have relocated.

The adit level upon the Copper Queen mine has attained a length of 770 feet with vertical depth of about 500 feet from the surface. For 450 feet the ore body has been continuous without a break. The ore body is from 3 to 5 feet in width and will average over $30 per ton, three-fifths of the value being gold.

ARIZONA.

Journal-Miner: The Commonwealth Company at Pearce is negotiating for the building of a 40-stamp mill for their property, and two mills will soon be erected for crushing ore. Williams and Cooper are to sink and timber a well and as soon as sufficient water is struck the mills will follow.

The Gold Cliff Company, in the Pearce district, is considering the advisability of working its ores. A crosscut on the ledge 112 feet from the surface reveals a vein over 20 feet wide continuing down.

A rich strike is reported in the Gold Cliff mine at Pearce.

The World's Fair mine of the Harshaw district is erecting a concentrating mill and four carloads of other machinery to treat the ore have arrived.

Tucson *Star*: The Patagonia mining region, which embraces Crittenden and Rollin, will be the center of much mining interest during the year. The copper and silver developments are promising. Several companies are developing mining properties which with depth are showing large bodies of high-grade ores. Shipments of ore extracted are increasing in volume, and reduction works are being erected.

Courier: At Chaparral the Annie mill has been started up with ten 900-pound stamps and three 6-foot vanners.

The Lost Horse mine has shut down for a short time because they have the dump full of ore, and the roads are so bad that they cannot haul.

The Lottie is working its mill night and day, and sinking its shaft.

There is a force of men at work on the Bunker Hill mine.

Mojave County *Miner*: H. R. McClure and F. Edwards have made a deal with a Philadelphia syndicate for their properties in Clear Creek. Provisions and mining supplies have been sent out and several men will be put to work.

Mechanical Progress.

Will Steel Frames of Tall Buildings Last?

What is occurring or what will occur to the metallic portions of the many tall buildings that are in process of erection at the present time, under great dissimilarity as regards temperature, humidity and other climatic conditions, but of one characteristic sameness, viz., being sealed in solid masonry or other coverings beyond the ken of inspection? Probably no engineering question of to-day is entitled to more serious consideration than this one. In discussing it recently before the American Society of Mechanical Engineers, Mr. M. P. Wood maintained that while inspection of some of the buildings now in progress, as well as some of those lately erected, reveals possibly a slight improvement in the means of preservation adopted over those apparent a short time ago, yet the improvement is a hollow mockery, and will bear fruit for repentance before many years have passed. These structures, though more carefully painted than those erected before, with more and heavier coatings of some kind of stuff called paint, do not appear in a single case to have received any attention or consideration as to the condition of the metallic surfaces before applying the protective coating beyond a possible sweep with a dirty broom to get rid of the rough dirt from the workshop yard, and a possible wipe with a piece of old sacking to remove the grease due to machine processes. There has been nothing like a washing down of the parts with soda ash or lye water to remove the grease, and then pickling with weak acid to remove the mill scale, and a subsequent washing with lime water to neutralize the acid bath, warming the work before painting it, and taking care to apply the paint only on clear, bright days, when no sweating can occur, or applying the paint in warm paint rooms. It is safe to say that not in a single case out of the many skeleton structures of modern sky-scrapers can this be found to have been the procedure. There would seem to be no better possible assurance than all this of trouble ahead for coming generations.—Cassier's Magazine.

Power Lost in Transmission by Belts and Shafts.

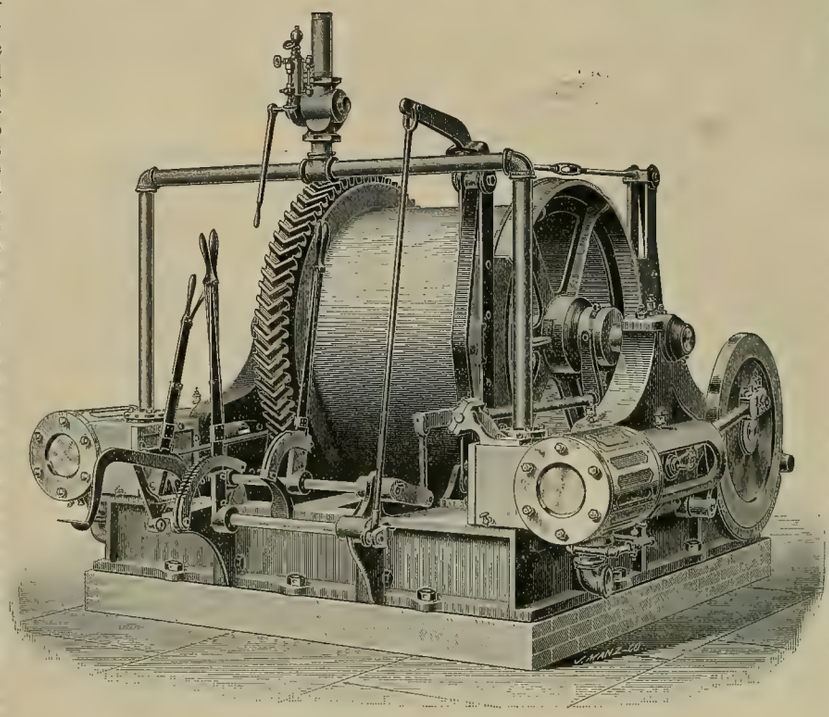
Prof. C. H. Benjamin, of the Case School of Applied Science at Cleveland, O., has recently made public his experiments in determining the loss of power through friction in the transmission by belts and shafting.

The observations were made in 16 factories, each engaged in a different kind of work. The method of making observations was as follows: During the daytime, when the works were in operation and the machines were running, indicator cards, showing the work being done by the engines, were taken each hour. Then during the noon hour or at night, when the engines were driving only the shafting, similar cards were taken, and when these and the first ones had been averaged the difference between the power required to drive the shafting alone and that required to drive the whole shop was found, and this reduced again to a percentage. The most startling loss was found in a bridge-material factory, where the shops were spread over a lot of ground. Eighty per cent of the engine's power was lost in the shafting there. In a planing mill the loss was 73 per cent; in a sewing machine factory it was nearly 70 per cent. It was 77 per cent in a stamping mill and 65 per cent in a boiler and machine works. The average loss for heavy machine shops was found to be 62.3 per cent. The average for light machine work was 55.1 per cent, and in but one instance did the loss fall below 47.3 per cent.

In this one case the percentage of loss was so small that it must serve as a serious commentary upon the character of the work generally done in putting up shafting. This was in a steel-screw works, and the loss was only 14.5 per cent. In this factory the machinery is all of the automatic type, very compactly arranged, and the shafting had been put up in the most careful manner. The shafting was in perfect alignment, and ran in hard cast-iron boxes without babbitt metal. It is supported by very rigid hangers, and was oiled by hand instead of wick oilers. The results of these observations were presented to the American Society of Mechanical Engineers, at its recent meeting, in a paper by Prof. Benjamin, and tables were given which showed the number of feet of shafting run in each of the factories under observation, and other features of the tests. One explanation of this immense loss of power, Prof. Benjamin says, is economy in either the quantity or the quality of the oil used. This cuts down the apparent size of the bills for shop expense, while the coal and water bills go piling up.

Double Cylinder Hoisting Engine.

The illustration represents an improved hoisting engine supplied by the Park & Lacy Co., 21 and 23 Fremont street, San Francisco, and specially designed for mine use, which is claimed to embody all the features necessary to the requirements of this coast. The valves are guaranteed to relieve, through the pressure plate, the strain upon the links usual in engines having unbalanced valves, and to be as easily reversed under steam pressure as when at rest. The guides are cast as a part of the drum and main shaft bearings, thus assuring perfect alignment. The crossheads are adjustable and fitted with brass slippers having broad wearing surfaces scraped to true planes, and steel crosshead pins. The connecting rods are made of hammered iron, polished full length, and fitted with selected hard brass boxings. The straps are held solid by bolts and are adjustable by means of hand-fitted keys. The main shafts are made of hammered iron, turned full length, and of proper size and length for drum duty. The drum shafts are made of steel, of ample diameter, and run in heavy anti-friction boxing. The brakes are of the post type, having sufficient resistance to hold the full weight of the load in suspension, and are operated by a foot treadle. On the clutch drum engine, as depicted in the illustration, the post brake is operated by a ratchet lever and additional brakes on the crank discs are provided, which are worked by a foot treadle located contiguous to the throttle valve. These engines are erected and tested under steam pressure, with brakes set, before shipment.



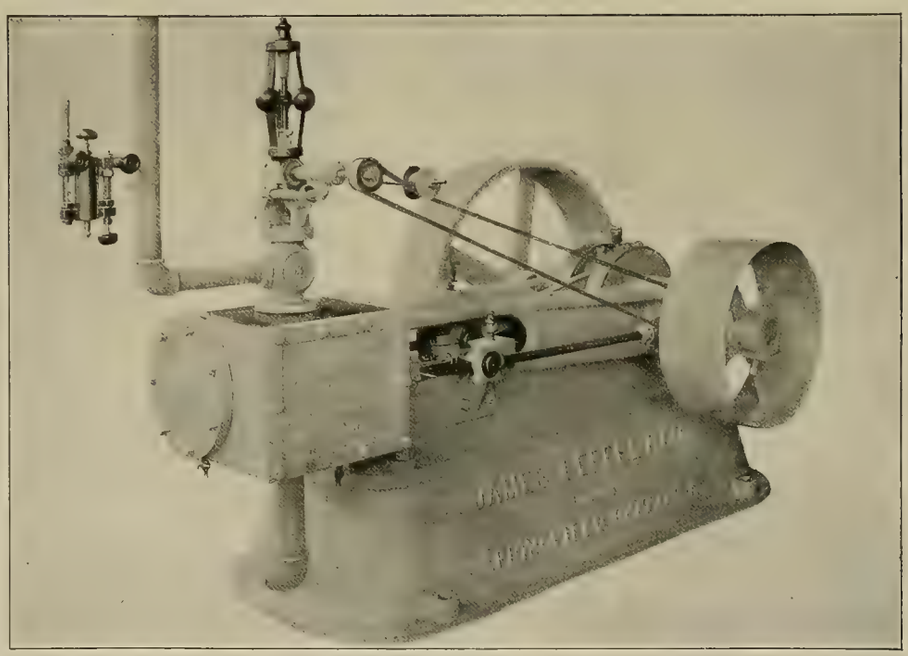
CLUTCH DRUM ENGINE.

Oxidizing Steel and Iron.

A great many parts of machinery are exposed to moisture and dampness, even if not directly to water. It does not always protect such pieces to paint them, but they can easily be fixed so that they will rust little if any if they be properly oxidized. A very good way is to make a mixture of nut galls and glacial acetic acid. After standing a while add a grain or so of nitrate of silver or copper sulphate to a small quantity of the mixture (say one ounce or so) and the solution is ready for use. Clean the surface of the metal with pumice stone, but do not use emery. Dry-air slack lime may be used after pumice stone, then cover the surface with liquid; let stand until covered with a coat of oxide. A scratch brush should then be used vigorously upon the metal and the coating, and standing repeated twice, twenty-four hours apart. After scratch-brushing the second time, clean the surface of the metal and rub with a little linseed oil and camphor.

New Standard Center Crank Throttling Engine.

The accompanying illustration shows a new pattern horizontal self-contained engine, designed and furnished by James Leffel & Co., Springfield, Ohio, who will send a descriptive catalogue upon application.



STANDARD CENTER CRANK THROTTLING ENGINE.

The builders of this engine state that they are prepared to adapt it for use as an automatic cut-off engine by dispensing with the throttling type of governor, and substituting an improved shaft governor of the automatic cut-off type on main shaft of engine, automatically varying the point of cut-off and amount of steam admitted to piston, to conform with the power being required and maintain the engine at its rated speed. This automatic governor is also adjustable for different speeds, and can be set to maintain a lower or higher speed than specified in table of standard dimensions, supplied by the builders.

A WORKMAN who was knocked senseless by an electric shock at the foundry of the Anaconda Copper Mining Company was resuscitated, after the usual expedients had failed, by removing his clothes, burying him in the foundry sand, except his mouth and nose, and thoroughly soaking the sand with a jet of water. The same experience happened to the same man twice.

Scientific Progress.

Ancient Metallurgy.

In the Anthropological section of the recent meeting in Liverpool of the British Association for the Advancement of Science, Dr. J. H. Gladstone spoke upon "The Transition from Pure Copper to Bronze Made with Tin." He said that copper was worked by the Egyptians in the Sinaiatic peninsula from the fourth to the eighteenth dynasty, perhaps from 5000 to 3000 B. C. At that period tools were made of pure copper in Egypt and Syria, and by the Amorites in Palestine, often on the model of flints. The efforts to make copper hard underwent three stages. The first was to get the copper to contain a large amount of cuprous oxide. The second was to mix it with arsenic and antimony. This was done by the Egyptians in the twelfth dynasty, and it was probably at first accidental, but one specimen had been found containing 3.9 per cent of arsenic, and this was probably a deliberately made alloy. Thirdly, it was gradually found that tin was the best metal to harden copper, but it was not so commonly found. Tin mixed with copper does occur before the bronze age, but only to a very small extent, ½ to 1 per cent. Afterward, as tin was more commonly found and became less expensive, it was more largely used, and so the bronze age was reached. In many parts of Egypt bronze tools and implements were found, and one specimen contained 9 per cent of tin. Prof. Flinders Petrie had found a bronze bar at Medum, in Egypt, in one of the small tombs belonging to the fourth or fifth dynasty. The brass of the early Israelitish period of the Bible was bronze. The immense amount of bronze used in ancient times, 5000 years ago, was astounding. The question as to where this large amount of tin was obtained is still unsolved.

BEFORE the British Association for the Advancement of Science, at the Liverpool meeting, Prof. W. Ridgway read a paper on "The Starting Point of the Iron Age in Europe." He said that the origin of the iron age is one of the most important points in European archæology. Scandinavia could not be its place of origin, for there the iron age began later than the Christian era. And it is admitted that the iron age came in per saltum in the Swiss lake dwellings, in Italy, Greece, France and Britain. Hellstadt, in Austria, was, in fact, the only place in Europe where articles of iron were found gradually replacing those of the same kind in bronze. Near the Hellstadt cemetery lay one of the most famous iron mines of antiquity. It was from this Austrian center that the use of iron spread into Italy, Switzerland, Gaul, Spain, Greece and eastern Germany, among tribes that were using bronze weapons and implements, and Tacitus was our authority on this point. In a discussion, Dr. Montelius pointed out that there were instances of the use of iron in Scandinavia, gradually superseding bronze, in the fifth or sixth century B. C. A. J. Evans said there is very early evidence of the use of iron in Syria, whence it spread to Greece, and the spread of iron in Britain was earlier than is generally supposed, as early, in fact, as the sixth century B. C., especially in Ireland.

THE reproduction of color now absorbs the attention of a large class of workers. M. Lippmann of the Sorbonne, Paris, says he has succeeded in obtaining pictures in color directly from the objects. A sensitive plate, of practically grainless coating, is attached to a tank of mercury in such a manner that the film and mercury are in absolute contact. The exposure is then made and the plate developed and fixed. Under certain conditions an image in colors is produced. This, however, is only visible at certain angles, just as the image in a daguerreotype, and the results cannot be said to give any encouragement to the idea that a practical process has been devised. Of more importance is the indirect method referred to above, by which a negative is made through a screen ruled in colors. From this negative a positive is made, which, when backed up with a ruled colored screen, yields a colored picture closely resembling the original.

THE question is often asked, Why is it that a person who is lost, whether it be in a dense wood or on a prairie, invariably moves in a circle, and always to the right? No satisfactory answer has ever been given for this well-known peculiarity under the circumstances mentioned. Some physiologists, anatomists, and speculative philosophers claim that the left leg in the human species is slightly longer than the right, and so takes longer steps, thus causing a motion to the right which in time completes a circle, if the mind is so bewildered that it has no fixed objective point in view. Perhaps the real answer to this queer question lies in the fact that most persons use their right hands in preference to the left, and are accustomed to passing objects on their right-hand side, and so, unconsciously, keep edging off to the right. On a prairie, however, where there is nothing in the way of obstacles worthy of mention, this cause or reason for walking in a "right-handed" circle would hardly hold good.

Electrical Progress.

A Great Water Power Project.

Public announcement has been made of a water-power project, which, in its magnitude, will surpass even that of the Niagara plants. The plan, according to an electrical contemporary, contemplates the development of 100,000-horse power by the diversion of a portion of the St. Lawrence river at the town of Messena, in St. Lawrence county, New York. It is proposed to create an artificial fall by diverting a portion of the stream to another channel, at a point where the topography is such that a canal less than four miles long will give a fall of about 50 feet. The Grass river flows parallel to the St. Lawrence, and the two are separated by a distance of only three miles. The Grass river discharges into the St. Lawrence at a point seven miles below Messena. In that distance the St. Lawrence falls about 100 feet, while the Grass river falls only 50 feet, so that at Messena the level of the latter is about 50 feet below that of the St. Lawrence. A canal about 3½ miles long will bring the St. Lawrence water to the bluff on the north bank of the Grass river, where it will have a sheer fall of 50 feet to the river below. The proposed canal will be 200 feet wide, and it is calculated will discharge 1,000,000 cubic feet of water a minute under a head of 50 feet. The cost of the canal, it is estimated, will be less than $1,000,000; and, according to the present plans, most of the power will be utilized on the spot in the operation of wood pulp mills and the calcium carbide plant.

THE Pioneer Electric Power Company of Ogden, Utah, has a set of castings consisting of one flange casting 6 feet 1½ inch internal diameter, two flange castings 4 feet 7⅞ inches internal diameter, one breeches pipe 6 feet internal diameter. The total weight of breeches pipe is 10,000 pounds, and of the flanges and breeches pipe 13,000 pounds. A stream of water flowing through a riveted steel pipe 6 feet in diameter, about one mile long, with a fall of 300 feet, is diverted by the breeches pipe into two streams, each 4 feet in diameter, leading to the power house. The casting is designed to stand a pressure of 200 pounds per square inch, and in reality will safely carry many times this load.

COMMANDER R. G. O. TUPPER of the English navy has been conducting a series of experiments at Portsmouth by which it was shown that by means of kites telegraphic communication could be established between ships of a fleet at considerable distances apart. The experiments were made by officers of the warships Daring and Dauntless. The end of a wire which the kite bore away from the Daring was dropped upon the deck of the Dauntless, where it was secured by the electrician of the ship and attached to a telephone apparatus in waiting. The other end, which had remained aboard the Daring, was also attached to a telephone, and as soon as this task was completed, the two ships were in perfect communication. The kite remained suspended, secured by two lines, for more than four hours, during which time communication between the Daring and the Dauntless was uninterrupted.

Practical Information.

Brass and Its Manufacture.

In taking up the price list of the American brass manufacturers we see the different headings, "rolled" or "sheet brass," which is generally known as "common or high brass," "brazing," "spinning" and "spring brass," etc., with the different prices per pound of these different grades of metal.

The brass which is ordinarily sold, unless otherwise specified, is known as common or high brass, and is spoken of as "rolled" and "sheet" brass, and consists generally of about 58 per cent of copper and 42 per cent of zinc. Looking farther down the list we see "brazing, spinning and spring brass" is worth one cent a pound more than common or high brass. This additional extra cent a pound is charged for the reason that this brass contains a little more copper than the high brass above referred to, the copper being the expensive part of the brass, and the price is generally directly in proportion to the amount of copper which enters into the composition of the metal, and this brass will generally contain about 60 per cent of copper and 40 per cent of zinc.

The next grade of brass is "extra quality" for brazing, spinning and a high class of spring brass. This is two cents a pound more than the common or high brass, and consists of about 62½ per cent of copper to 37½ per cent of zinc. The next, "low brass," is four cents a pound more than the common or high brass, and contains 66⅔ per cent of copper to 33⅓ per cent of zinc. Gilding brass, oreide and bronze are generally about seven cents a pound more than the common or high brass and contain anywhere from 70 to 90 per cent of copper, with the remainder zinc.

In all of these brasses a great number of mill men are using a small percentage of aluminum, as it makes the brass flow more freely and gives it additional fluidity, and also combines with the impurities in the zinc and brings them to the surface, thus enabling them to use poorer zinc than they would ordinarily use, and at the same time secure stronger and tougher metal. Aluminum is used to a small extent in sheet brass, and to a very large extent in brass castings. The best brass in the world is made in the United States, for the reason that we have within our borders the very purest of copper and the very best of zinc.—The Foundry.

Gold in the Ocean.

Seventy-five billion tons of gold lie in the ocean. This is the conclusion of Prof. Liversidge, of the University of Sydney, after nearly five years of experiment.

Dr. Wurtz read a paper on the subject before the American Association for the Advancement of Science as far back as 1866. Many persons have laughed outright at the assertion, others have found it interesting reading for a dull moment, and still others have ascribed to its originator wonderfully strong imaginative powers. Science hasn't, at any time, considered it seriously. Now, however, appears Prof. Liversidge, who says it is true. Moreover, the Professor has ascertained to a nicety how these seventy-five billion tons of gold are distributed in the waters throughout the globe. Month after month he confined himself in his laboratory, and there, with his delicate instruments and faithful chemicals, he wrung the story from the silent seas. He obtained specimens of sea water from various spots. Friendly ship captains brought him jars full from near and far. After his protracted labors, and when at last he has satisfied himself that he made no errors, he thus has unbosomed the results in his memoir:

"The amount of gold obtained from sea waters in my experiments must necessarily be less than the total amount of gold present in the water, since it was found that known quantities of gold chloride solution added to distilled and sea waters, and then estimated by precipitation, scarification and cupellation, showed a loss, and sometimes a very considerable one.

"All evidence is in favor of gold being present in sea water off the New South Wales coast in the proportion of about one-half to one grain per ton, or, in round numbers, from 130 to 260 tons of gold per cubic mile.

"This of course, means an enormous amount for the whole of the ocean, the cubic contents of which used to be put down at 400,000,000 cubic miles. If gold be uniformly present at the rate of one grain per ton, the total amount would be over 100,000,000,000 tons of gold.

"A later estimate is 308,710,679 cubic miles. This even would mean over 75,000,000,000 tons of gold."

There need be no fear however that the seventy-five billion tons of gold will be thrust upon an amazed world to derange financial systems and make the metal a glut.

There is no known method of profitably coercing the gold from its floating habitation. To all appearances it will lie in its restless security a long while before man's ingenuity will have devised a cunning way to wrench it without loss from the deep for his purposes. Only scientists, with their costly chemicals, can now do that, and the gold thus obtained is secured dearly.

MANY persons still believe that the instinct of animals preserves them from certain accidents, and that they never eat anything that is injurious to them. Well-instructed persons have long known that in this regard animals are no better off than men. A chicken does not hesitate to drink paint; a cow partakes of water in which bags containing nitrate of soda have been washed; ducks strangle and choke in swallowing snails. M. Giraud, a veterinary at Barnewitz, now notes a fact that merits the attention of poultry farmers. He has observed numerous cases of poisoning in ducks following their feeding on caterpillars, especially those of the cabbage moth; these caterpillars have been given to the fowls in mass or are found on the cabbage leaves furnished them for food. After from six to twenty hours, according to the number of caterpillars eaten, poisoning manifests itself by loss of appetite, great weakness, tottering steps, accompanied sometimes by symptomatic movements, finally by difficulty of breathing, and often death, after an agony of variable duration, during which the beak and claws grow pale.

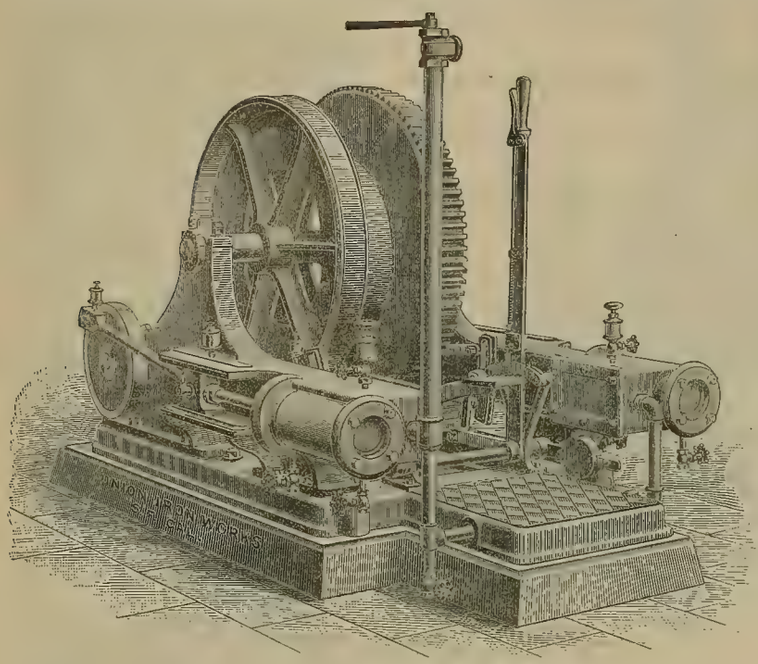
NO OTHER iron range so far discovered possesses greater apparent reserves than the Mesabi of Minnesota. Conservative estimates formulated from the records of properties now exploited and worked, together with others determined by systematic explorations and analyses, show that the Mesabi range can supply ore (which will equal in average iron and phosphorus contents) double the quantity which the entire Lake Superior region has produced in fifty years. This means 200,000,000 gross tons. In this estimate there are not included a number of properties which have been imperfectly explored.—John Birkinbine in The Foundry.

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The entire hoist is self-contained, being mounted on an iron sole plate or bed which carries all the operating levers and provides a footboard for the operator. The engines are provided with reversible link motion and the drum with a broad strap brake, insuring safe and rapid work.

The general lines upon which this hoist is designed are neat, strong and substantial and all the operating parts are conveniently arranged.

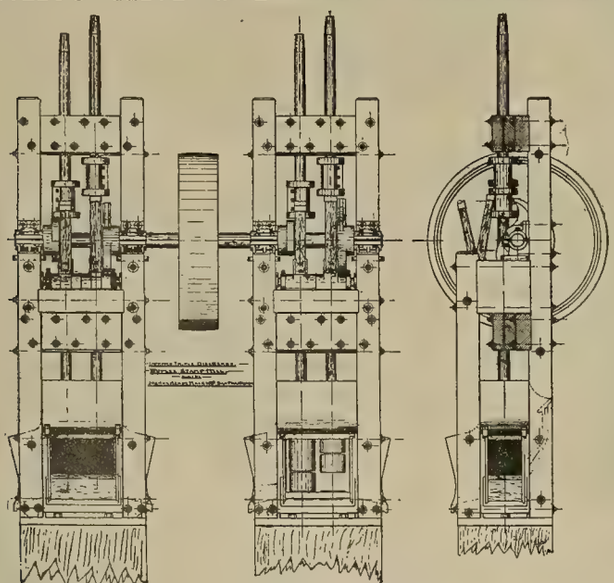
The size herewith illustrated is the 4 in. x 10 in., rated at 15 horse power. The larger sizes, 8 in. x 12 in. and upwards are provided with post brakes.

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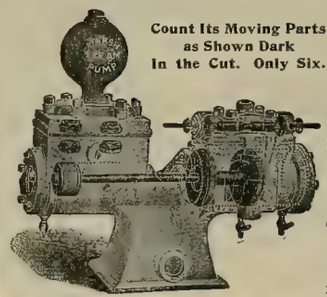
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Book Reviews.

The Tutorial Statics: The Tutorial Chemistry: These two octavo volumes of 270 and 225 pages respectively are from the University Tutorial Series and are admirably adapted for instruction, being applicable alike to the requirements of the teacher or student, and are also valuable as works for reference. The former discusses the laws of physics, mechanical forces, principles of virtual velocities, the laws of friction, the book requiring but a rudimentary knowledge of trigonometry to be of value to the unaided student; the latter of the two books takes up a systematic outline of the chemistry of the non-metals and is essentially a book for the teacher, though of manifest value in connection with laboratory practice. The books are published and for sale by Hinds & Noble, 4 Cooper Institute, New York; price of each, $1.

Monetary Systems of the World: This work, by M. L. Muhlman, deputy assistant treasurer of the United States, is of unusual value. Without any political or partisan prejudice the monetary system of this country is clearly and accurately explained, as well as the monetary system of every other nation on earth. The information in the book is merely a compilation, but is the condensed cream of many works, and so arranged as to be of value to a busy man who wants the undiluted facts. It is a vade mecum of modern monetary science. Published by Chas. H. Nicoll, 189 Broadway, New York; price $2.

Catalogues, Etc.

Leyner Drills, Air Compressors and Receivers: An illustrated description of the Leyner Rock Drill and Air Compressors, with sectional views, data, descriptions and testimonials. The machinery specified is manufactured and sold by the E. P. Allis Co., whose branch office is at 9 Fremont St., S. F. "Engines" is the title of another very handsome catalogue received from the same company, 185 pages of finely printed illustrations and descriptions of various styles of engines built by the company and installed throughout the country. On page 100 is illustrated the "St. Louis type" of vertical compound pumping engine, one of two built for the city of St. Louis, each being 72 feet in height and of a capacity of 30,000,000 gallons in twenty-four hours. Sundry forms of mining machinery also receive elaborate notice; on page 130 is portrayed the Reynolds steam stamp; one of these stamps in the stamp mill of the Tamarack Mining Co., Opechee, Mich., has a crushing record of 1920 tons of conglomerate copper rock in six days.

La Belle Gold Fields and Trinidad, the Gateway: The Gunnison Gold Belt, two superb brochures issued by B. L. Winchell of the passenger department of the Denver and Gulf R'y of Colorado, illustrate by contrast the apathy of California railroads in this regard. These handsome little books, like many of their predecessors, are admirably designed to attract attention to the mining wealth of Colorado and, incidentally, to secure increased traffic for the railroads. Statistical description and handsome illustrations combine to make a very attractive showing for the region described. The railroads centering in Denver aid and foster the mining industry of Colorado and are, of course, great gainers thereby, and deservedly.

Coast Industrial Notes.

—The Humboldt and Trinity, Cal., Toll Road Company proposes to build a wagon road from Mad river to Hay Fork, and have it built by next winter. Surveys are now being made.

—Seven carloads of brandy were shipped from San Jose to Philadelphia this week by the Naglee estate. The shipment was in casks and consisted of over 27,000 gallons. The brandy is from fifteen to twenty years old, and, at the present market value, is worth nearly $200,000.

—The Mill Valley & Mount Tamalpais Scenic Railroad Co. are considering the question of extending their road to Bolinas, on the Marin coast. The country that must be traversed by the new line is mountainous and the construction of the road will require considerable engineering skill.

—C. R. Lloyd of this city, the principal stockholder in the San Bernardino Electric Light Company, has bought the East Riverside, San Bernardino Co., Cal., water power and the connecting wires owned by the Electric Light and Power Company, adding 250 horse power to its capacity, and has made arrangements to connect with the wires of the Redlands Company at Colton, thus securing the benefit of 500 horse power, the surplus of that company. The purpose is to furnish motive power for street railroads and also power for the Santa Fe shops.

Obituary.

Prentiss Selby died at his residence in Oakland last Friday, aged 50 years. Mr. Selby was a son of the late Thomas H. Selby, founder of the Selby Smelting and Lead Works, and was born in New York. In the early fifties he came to California to join his father, who had preceded him, and when the smelting works were established at North Beach he took a position there and in time became superintendent, a position he occupied for a number of years. He retained a large interest in the company and took an active part in its affairs up to the time of his death. During his life Mr. Selby, while always a prominent man, was never connected with any public office.

Recently Declared Mining Dividends.

Ontario, Park City, Utah, $15,000; payable Jan. 30.

Centennial-Eureka, Utah, $30,000; payable Jan 21.

Morning Star Gravel Mining Co., No. 74, $4 per share.

Lelloi Mining Co., Rossland, B. C., $25,000; payable Jan 31.

Atlantic, Mich., Copper Mining Co., $1 per share, $40,000, Feb 10.

Boston & Montana Copper M. Co., $3 per share, $450,000, Feb. 20

The Pennsylvania Mining Company, Grass Valley, Cal., $5000; payable Feb. 1.

Alice Mining Co., Montana, $25,000; payable Jan. 19. This is a total to date of $995,000.

Homestake, Black Hills, South Dakota, $31,250; payable Feb. 25; a total to date of $6,118,750

Hecla Consolidated Mining Co., Glendale, Montana, $15,000; payable Jan. 25; a total of $2,160,000 to date.

The following will also pay dividends this month: Calumet & Hecla, $1,500,000; Quincy Copper Mining Co., $400,000; Gold Coin, $20,000; Osceola Copper Mining Co., $50,000.

The new year begins well with dividends in Utah. The Centennial-Eureka has already distributed $30,000, making a total of $1,890,000 to date, and Bullion-Beck $20,000, which advances its total to $1,967,000. Mercur paid out $25,000, which makes a total of $300,000, and Galena $5000, making a total of $71,000. South Swansea paid $7500 during the month, which made a total of $15,000, while the Swansea paid $5000 among its stockholders, who have divided $26,500 to date. The dividends by these companies alone for the month amount to over $100,000.

Personal.

F. KLEPETKO succeeds Thos. Couch in the general management of the Boston & Montana Co.

PROF. R. A. F. PENROSE and John Brockman, owners of the Pearce mine north of Bisbee, Arizona, are in San Francisco.

JOSEPH GRUSS and son George have gone to Australia, where Mr. Gruss will take the management of some mines for an English company.

MR. BERTRAM HUNT, the new local manager of the Gold and Silver Extraction Co. of America, has arrived, and assumed charge at the company's office in this city.

EX-JUDGE GEORGE TURNER, one of the heaviest shareholders in the Le Roi mine in the Trail Creek district, British Columbia, has been elected United States Senator from Washington.

MR. W. WESTON, mining engineer of Cripple Creek, has made a second examination of the White Hills (Arizona) Mining and Milling Company's property for British capitalists. He left Kingman on the 26th ult. on his way back to Colorado.

JOHN HAYS HAMMOND, consulting engineer for the Consolidated Gold Fields, Limited, will leave London next week for South Africa. His main purpose as to the mines controlled by his companies is to start more active working. His present intention is to remain but a short time before returning to London, after which he proposes to come out to the Pacific coast for a short trip.

GENERAL WILSON, who succeeds General Craighill as Chief of Engineers of the United States Army, has twice been detailed for work in California. On the occasion of his last visit he was engaged on the work of the Debris Commission on the Yuba and American rivers and made tours of inspection along the upper Sacramento and Feather rivers. He is familiar with all the conditions about the Bay of San Francisco.

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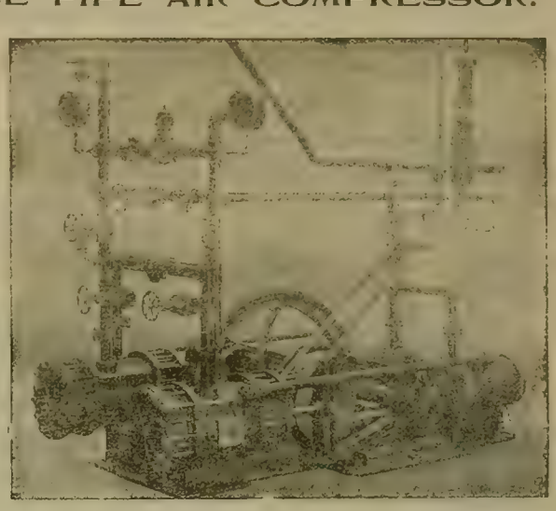
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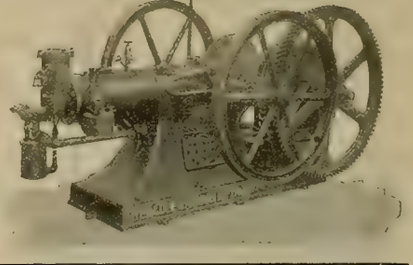
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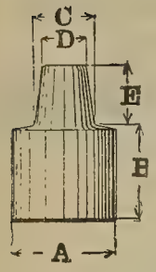
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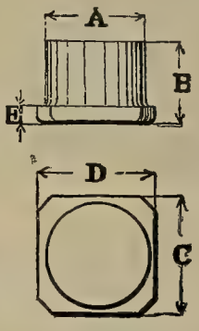
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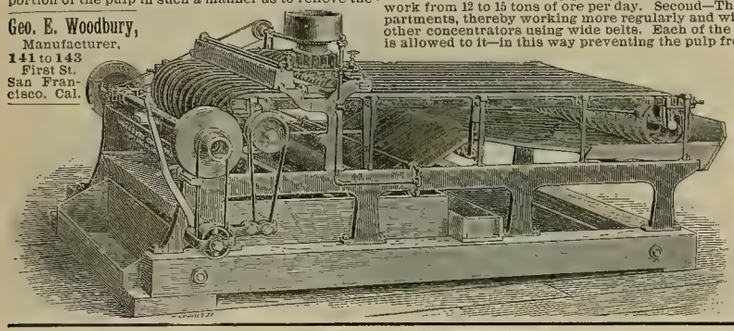
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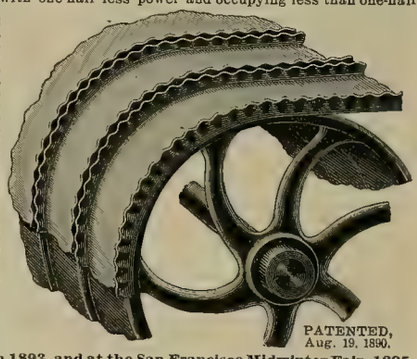
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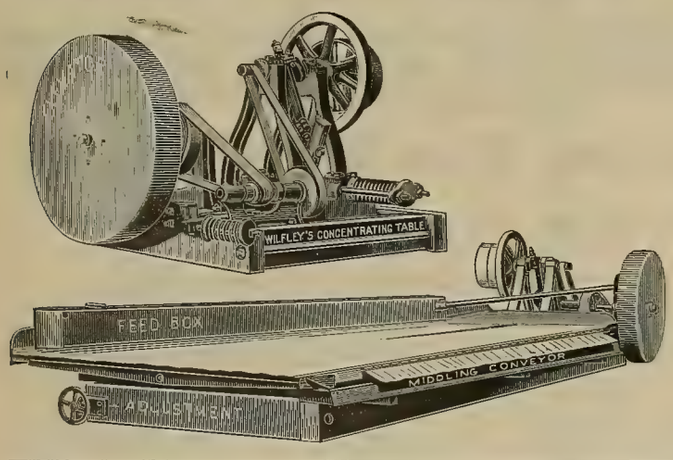
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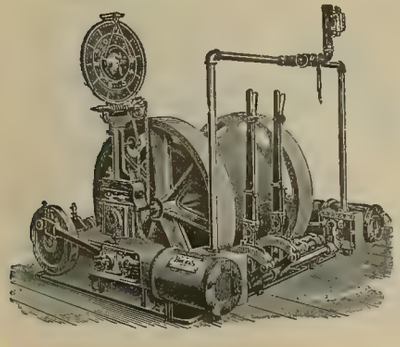
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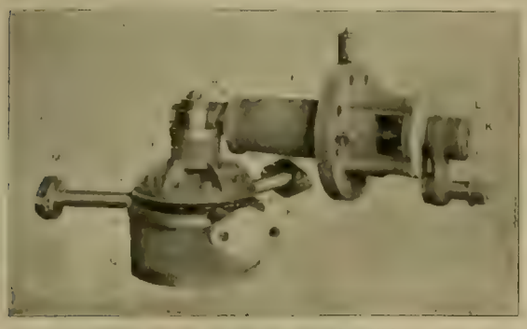
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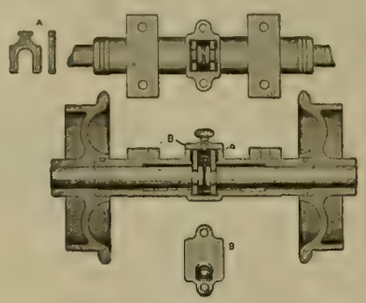
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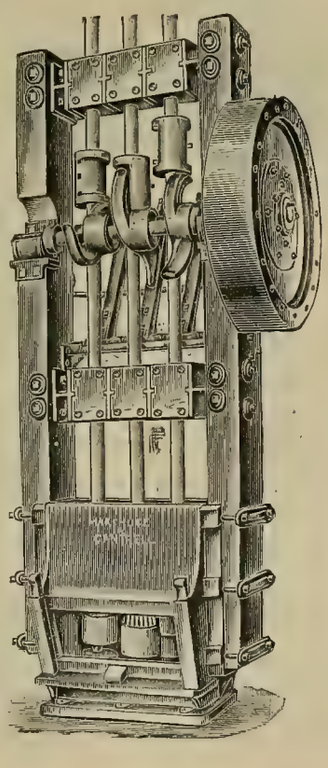
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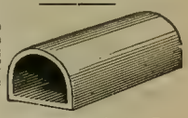
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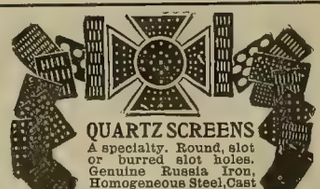
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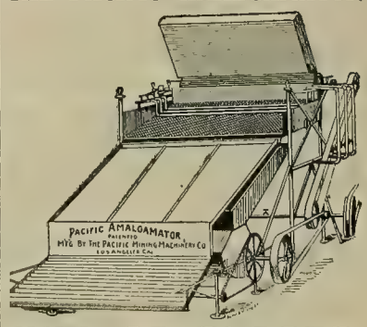
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List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JAN. 26, 1897

576,077 —NUT LOCK—C. C. Cuyler, Arago, Ogn
576,500 —SAW GAGE—G. W. Drew, S. F.
576,042 —BOTTLE—C. T. Driscoll, San Jose, Cal.
575,804 - FRUIT PITTER—J. Harrison, Vacaville, Cal.
575,807 - SOLDERING MACHINE—A. Johnson, Oakland, Cal.
575,883 —TOURIST'S CASE—Ellie E. Johnston, Angels Camp, Cal.
576,064 —PENCIL SHARPENER—P. L. Lord, Riverside, Cal.
575,741 —WATER CLOSET—M. Morell, Santa Barbara, Cal.
575,758 - ELEVATOR—E. L. Parker, Los Angeles, Cal.
575,814 - DIE FOR PHOTOGRAPHIC MOUNTS—P. J. Stuparich, S. F.
576,003.—CAISSON—J. M. Thorp, San Jose, Cal.
575,864 —AMALGAMATOR—J. J. Tinker, Portland, Ogn.
576,015 —WASHING MACHINE—D. F. Whiteman, Oregon City, Ogn.
575,940 —INCUBATOR—Helen S. Whitton, Fruitvale, Cal.
576,058 —DESIGN, WATER WHEEL BUCKET—E. P. Jones, Alameda, Cal.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible by mail or telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FRUIT PITTING AND SPREADING MACHINE.—James Harrison, Vacaville, Cal., assignor of one-third to James T. Foster of Berkeley, Cal. No. 575,896. Dated Jan. 26, 1897. This invention relates to a novel feeding mechanism, and means for pitting, dividing and separating the divided fruit, means for receiving and advancing the divided sections of fruit and spreading them upon the trays, and means for advancing the trays, and other details of construction and arrangement. It consists essentially of the combination of a vertically reciprocating knife for severing the fruit, forcing its pit out, a pair of auxiliary knives converging downwardly and movable with the main knife and adapted to enter the fruit from above, and means for engaging the upper portions of the auxiliary knives to separate the lower edges thereof, whereby the fruit is opened from its top downward, and the sections laid on their backs. In conjunction with this is an inclined shaking table adapted to receive the sections of fruit thus laid out and advance them down the incline, and a series of advancing trays adapted to receive the fruit sections.

DIE FOR MANUFACTURING CARDS FOR PHOTOGRAPHIC MOUNTS.—Paul J. Stuparich, San Francisco, Cal. No. 575,814. Dated Jan. 26, 1896. This invention relates especially to improvements in the dies for the manufacture of cards for photographic mounts, art panels, and other similar purposes. It consists of a card or base having an independent surface of roughened material, a central panel formed by removing a portion of the rough material and a previously formed hard rim disposed around the periphery of the panel so as to form upon the card when acted upon by a suitable brace, an exterior roughened surface, an interior panel and intermediate depressed channel.

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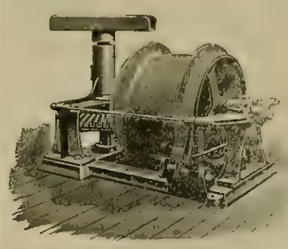
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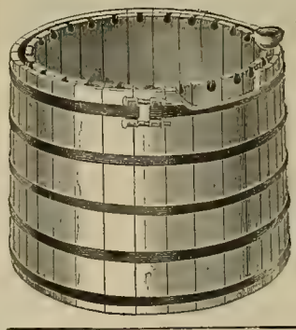
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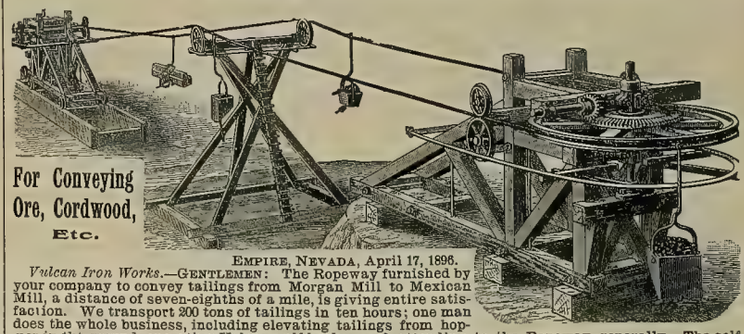
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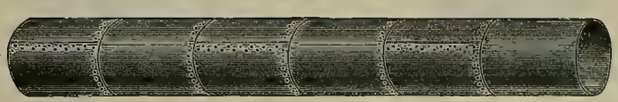
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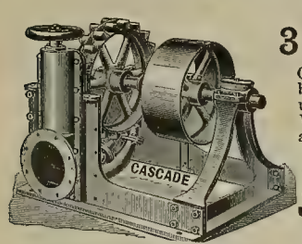
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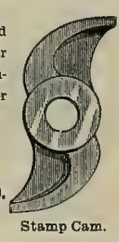


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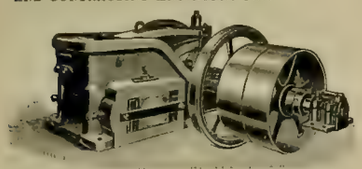
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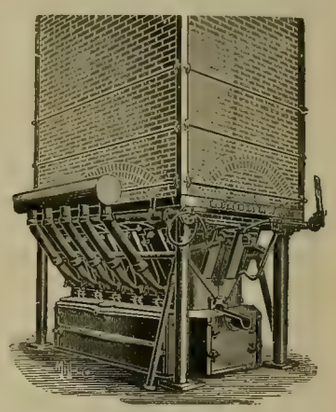
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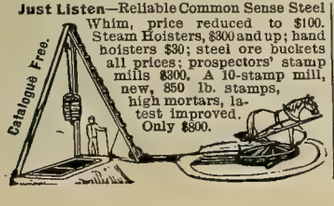
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Market Reports.

The Markets.

SAN FRANCISCO, Feb. 4, 1897.

Rains the past week have interrupted business by confining purchases to actual near-by wants. Bad roads in the interior prevent country consumers from coming to distributive centers, confining business to townspeople. It is stated that, with settled weather and better roads, trade will pick up and by the end of the current month largely increased orders will be coming to hand. There is a continued good movement by vessels to coast points and also to foreign ports in the Pacific. The general feeling with the trade is that values of about all lines of goods are bottom and there will be a gradual change for the better. Crop advices continue favorable. Unless there is some unforeseen unfavorable climatic change later on, California will have bumper crops of wheat, fruits and everything turned out on the farm and dairy. It looks now as if the call for farm implements will be the largest the coming season than for over half a decade. Rains and snow deposits cause a cheerful feeling in districts where there has for several seasons past been more or less shortage of water for extended mining operations.

Contrary to expectation, exchange on New York has strengthened. Why this is so it is past finding out. Several reasons are assigned. One is that large holders of idle money are sending it out of the State so as to avoid paying taxes, for assessment day is in next month; while another is that considerable is going to New York so as to get the better interest allowed by banks there. It looks as if the first reason is the true one, for it is a well-established fact that there is no very great demand for money for new ventures or otherwise until after the first Monday in March. The rates of interest are still in favor of borrowers giving gilt edge security, but lenders do not seem disposed to press for loans in this month. The export clearances of goods to foreign ports aggregate the past week over $800,000. These large weekly shipments add still further to the general ease here. New York mail advices state that many loans secured on sterling exchange will be paid off, owing to cheaper rates of money at the East. New York banks continue to adhere to a 2 per cent discount rate for call loans, but trust companies place funds at 1½ to 1¾ per cent. The inquiry in that market for funds is light, but an improvement is looked for soon.

New York Silver Prices.

NEW YORK, Feb. 4.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	29¾	64⅞
Saturday	29 11-16	64¾
Monday	29 11-16	64⅝
Tuesday	29 11-16	64⅝
Wednesday	29¾	64¾
Thursday	29¾	64¾

	Copper.	Lead.	Iron.	Tin.
Friday	12 00	3 07½	11 00@13 00	13 65
Saturday	12 00	3 07½	11 00@13 00	13 60
Monday	12 00	3 07½	11 00@13 00	13 40
Tuesday	12 00	3 15	11 00@13 00	13 45
Wednesday	12 00	3 15	11 00@13 00	13 50

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	20c Prem
New York Telegraphic Transfer	22½c Prem
London Bankers' 60 days	$4.86¼
London Merchants	$4.85
London Sight Bankers	$4.88½
Refined Silver, per oz., 1000 fine	64¾
Mexican Dollars	51½@52

SILVER.—There is a continued steady demand. For over one month there has been a better export movement than ruled at the corresponding time last year. This increase has not been confined to this city alone, for New York advices are to the effect that shipments show quite a gain. The movements, so far as we are advised, have been on legitimate business lines and in no way of a speculative character. If it is true that there has been an absence of speculative buying, then the situation looks healthy.

MEXICAN DOLLARS.—The market is extremely quiet, but this always obtains during Chinese New Year's holidays. This lasts about fifteen days.

ANTIMONY.—Our market is quoted at 7⅛@8c in a jobbing way. New York mail advices quote 7½c for Cookson's, 6¾@6⅞c for Hallett's and 6½c for Japanese.

QUICKSILVER.—A sudden jump of 5s in London caused an advance to $37.50 in our market and at New York to $37 to $37.50. The demand is quiet.

The market is quoted as follows:

Domestic trade, per flask	37 50

For export, quotations are nominal but less than for home.

BORAX.—The outward movement seems to be increasing.

The market is quoted as follows:

Refined, in car lots	5
Refined, in sacks	4¾
Powdered, in car lots	4½
Concentrated, "	5

COPPER.—The general situation is quite bullish and indicating that the markets at home and abroad will move to still higher figures. The exports in last month aggregate larger to Europe than in January, 1896, which strengthens the conviction that the consumption abroad is not decreasing, but rather increasing, and even with a larger production it will tax producers to meet requirements.

The local market is quoted as follows:

Ingot, jobbing	14¼@—
Ingot, wholesale	—@13½
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17c

LEAD.—The market has strengthened again at the East, moving this time to a higher range than for many months. The action of the market looks as if a bull campaign has been inaugurated abroad in tin, lead and copper.

Our market is quoted in jobbing lots as follows:

Pig	3 75	@	3 85
Bar	—	@	4 00
Sheet	—	@	5 25
Pipe	—	@	4 50

SHOT.—There is a moderate demand.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs			$1 20
Drop, B and larger sizes,	"	"	1 45
Buck, Balls and Chilled, do.	"	"	1 45

TIN.—Pig advanced and then shaded off, only to recover towards the close. For plate the local market is irregular, with quotations for American hard to get correctly. The consumption of pig is increasing at the East and abroad, and with decreasing stocks the markets are strong.

We quote as follows:

Pig, per lb	14¼c	@	—
Plate, I C coke, heavy, per box	$4 05	@	—
" " " light, "	3 95	@	—

IRON.—The market is well supplied with spot, but to arrive the supply is said to be small. At the East there seems to be a steadier feeling. Exports of Southern to Europe are still large. From the Bulletin of the American Iron and Steel Company we excerpt the following:

"The American Iron and Steel Association has received from the manufacturers complete returns of the production of pig iron in the United States in 1896, and also complete returns of the stock of unsold pig iron in hands of makers or their agents at the close of the year. The total production of pig iron in 1896 was 8,623,127 gross tons, against 9,446,308 tons in 1895, 6,657,388 tons in 1894, 7,124,502 tons in 1893, 9,157,000 tons in 1892, 8,279,870 tons in 1891 and 9,202,703 tons in 1890. There was a great shrinkage in production in the last half of 1896, but in the twelve months embracing the last half of 1895 and the first half of 1896 we made 10,334,986 tons of pig iron. This large production was due to the boom of 1895. A greatly decreased production in the last half of 1896 was due to the reaction from that boom and to the uncertainty and apprehension attending the Presidential campaign of that year. The production of Bessemer pig iron in 1896 was 4,654,955 tons, against 5,623,695 tons in 1895, a decrease of 968,740 tons. The production of basic pig iron in 1896 amounted to 336,403 tons, distributed as follows: New England, New York and New Jersey, 22,692 tons; Allegheny County, Pa., 168,095 tons; other counties in Pennsylvania, 51,768 tons; Virginia and Alabama, 73,680 tons, and Ohio and Wisconsin, 20,244 tons. The production of charcoal pig iron in 1896 was 310,244 tons, against 225,341 tons in 1895, an increase of 84,903 tons. The production of spiegeleisen and ferro-manganese in 1896 was 131,940 tons against 171,724 tons in 1895. The stocks of pig iron which were unsold in the hands of manufacturers or their agents on Dec. 31, 1896, and which were not intended for their own consumption, amounted to 847,686 tons, against 705,847 tons, which were similarly held on June 30, 1896, and 58,132 tons on Dec. 31, 1895."

AMERICAN.	To Arrive.	Spot.
Sloss	$21 00	$23 50
Thomas	22 00	23 50
Salisbury	30 00	33 00
ENGLISH.		
Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—Imports the past week were mostly from coast points. Foreign coals continue steady. If crop prospects continue good, more offerings will be made for shipment in the spring months. There is no cannel in market.

We quote as follows:

SPOT FROM YARD—PER TON.			
Wellington	$8 00	@	—
Greta	6 00	@	6 50
Nanaimo	6 50	@	7 00
Cumman	5 50	@	6 00
Seattle	5 50	@	6 00
Coos Bay	—	@	5 00
Cannel	8 00	@	—
Egg, hard	12 00	@	13 00
Wallsend	—	@	6 50
TO ARRIVE—CARGO LOTS.			
Australian			5 50
Liverpool Steam			6 25
Scotch Splint			—
Cardiff			6 25
Lehigh Lump			9 00
Cumberland			13 00
Egg, hard			10 00
West Hartley			6 50

COKE.—The market is quoted as follows:

Gas Companies'	—	@	—
English, to load	9 50	@	—
" spot, in bulk	10 00	@	—
" in sacks	11 00	@	12 00
Cumberland	—	@	—

LUMBER.—Agents report a continued good shipping demand.

Redwood, Fluming	17 00	@	—
Pine	14 00	@	19 00
Spruce	26 00	@	31 00

NAILS.—The market is feverish and uncertain.

Wire, carloads, basis per keg			
" jobbing, " "			$2 20
Cut, carloads, " "			
" jobbing, " "			2 00

POWDER.—The demand is fair.

The market is quoted as follows:

Hercules, No. 1*, per pound	11½c
" No. 2, " "	8½c

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.	Secretary.
Alta S M Co, Nev	54	5c	Dec 14	Jan 18..Feb 8	J E Jacobus, 309 Montgomery
Andes S M Co, Nev	43	10c	Feb 1	Mar 8..Mar 31	Jno W Twiggs, 309 Montgomery
Anita G M Co, Cal	12	5c	Dec 21	Feb 1..Feb 18	L F Reichling, 404 Montgomery
Best & Belcher M Co, Nev	61	25c	Jan 26	Mar 2..Mar 23	M Jaffe, 309 Montgomery
Bullion Con G M Co, Cal	10	10c	Nov 30	Jan 11..Feb 10	C A Grow, Mills Bldg
Confidence G M & M Co, Co	1	10c	Jan 19	Feb 27..Mar 20	F Aureguy, 320 Sansome
Eureka Con Drift M Co, Cal	7	5c	Jan 20	Feb 26..Mar 20	D M Kent, 330 Pine
Eureka Con M Co, Nev	14	25c	Jan 18	Feb 23..Mar 15	H P Bush, 134 Market
Gould & Curry S M Co, Nev	80	15c	Dec 14	Jan 19..Feb 9	A K Durbrow, 309 Montgomery
Gold Hill M Co, Cal	11	25c	Jan 8	Feb 15..Mar 4	C A Grow, Mills Bldg
Gray Eagle M Co, Cal	45	5c	Dec 23	Jan 30..Feb 23	W J Gurnett, 308 Pine
Hartmann Mining Co, Cal	1	5c	Dec 22	Feb 1..Feb 23	G W Peer, 4 Montgomery
Jamison M Co	9	5c	Nov 27	Feb 24..Apr 21	Sam W Chevney, 120 Sutter
Julia Con M Co, Nev	28	5c	Jan 21	Feb 26..Mar 19	J Stadtfeldt Jr, 309 Montgomery
Marguerite G M & M Co, Cal	5	10c	Jan 14	Feb 25..Apr 8	Chas Peach, 237 Twelfth
Mineral Hill M & S Co, Cal	1	5c	Jan 4	Feb 15..Mar 25	Chas Peach, 210 Sansome
Thorpe M Co, Cal	5	5c	Jan 13	Feb 23..Mar 15	A F Frey, 44 Phelan Building
Utah Con M Co, Nev	24	5c	Jan 14	Feb 17..Mar 8	A W Havens, 309 Montgomery

Mining Share Market.

SAN FRANCISCO, Feb. 4, 1897.

Under the lead of Con. Virginia the market fluctuated the past week from 5 to 10 per cent, closing yesterday afternoon at a slight advance on the lowest price of the week. Con. Virginia sold down to $1.90 and then recovered yesterday to $2.10 and $2.15. At the declining prices there was a good deal of stocks reported to have come out from outside holdings. Their selling, it is said, was due to a gradual shrinkage in values and fears of another line of assessments being levied at an early day. These assessments, the MINING AND SCIENTIFIC PRESS asserted in December last, were inevitable, and therefore to the informed is not cause for surprise. While there has been buying from stronger parties, yet there is nothing, so far as surface indications go, to warrant the belief that it is by insiders—those capable of promoting and sustaining a good-sized deal. The buying seems to have been done largely by shorts filling and two or more small outside pools. The latter are always content with a small profit and therefore sell whenever possible on a small bulge in prices. On more than one occasion we have asserted that the shares of the Comstock and other mines listed on the two exchanges are only worth for investment the ore in sight, with a reasonable per cent added for prospecting work that is being done. All over these prices is largely fictitious and dangerous to operate at. At this writing there are two points which deserve watching for near-by results, but there are others which will do to watch later on. These two points are the upraise in Con. Virginia from the 1650-foot level and at the long west crossdrift that is being run jointly by Confidence, Challenge and Con. Imperial. In the Bodie district the work reported by Standard seems to grow in interest. This company has commenced to overhaul their mill with the view of making thorough repairs and adding the latest improved machinery, so as to make it the most complete and best equipped milling property on this coast. The consolidation of the companies heretofore mentioned is nearly complete, for over 90 per cent of the old shares have been redeemed, canceled and new shares issued.

It is worthy of regard that the Chollar-Brunswick ore which is being milled at the Nevada mill shows honest management and reflects credit on the company. In substantiation of this, we take the following from the last official letter: "From all points (Brunswick lode) have saved and shipped for the week 113 tons and 1800 pounds of ore; average car sample assay: gold $31.57, silver $18.69 per ton. Wagon samples: gold $27.28, silver 19.19 ounces. Battery samples, average for the week: gold $35.02, silver 18.22 ounces per ton." It will be seen that the gold battery assays are higher than the other two assays.

The following companies report cash on hand February 1: Alta $3139, Andes $1478, Alpha Con. $3005, Best & Belcher $544 (with $2500 due to the bank), Bullion $298, Caledonia $3046, Chollar $1731 (with $7000 due the bank on a note), Challenge Con. $2051, Con. Imperial $620, Confidence $2027, Con. New York $451, Con. California and Virginia $16,980, Crown Point $4729, Exchequer $2674, Gould & Curry $9468, Hale & Norcross $2265, Mexican $6286, Occidental Con. $1067, Overman $6148, Potosi $6630, Savage $12,324, Sierra Nevada $5968, Segregated Belcher $516, Silver Hill $49, Standard $38,370, Syndicate $870, Union Con. $8090, Utah Con. $463.

The Belcher Mining Company reports an indebtedness of $801 and the Lady Washington one of $1040.

The work reported by the leading mines on the Comstock is practically unchanged, but at several points it grows interesting, yet this may be only a repetition of similar prospects in years gone by; and while the favorable indications may not fill, yet it is to be hoped they will for the good of the share market. In Utah they continue to find stringers of quartz on the level heretofore reported. In Sierra prospecting work is continued on the Layton tunnel level; no change in formation. In Union they are still prospecting the 900-foot level. The north drift was, at last advices, in porphyry with seams of gypsum, which shows some value. In Mexican they are still extending west crossdrift No. 2 on the 1000-foot level. In Ophir work is confined to the Central tunnel and 1000-foot levels. Indications are said to be more favorable. They raise a few tons of about $30 ore each week from the former level. In Con. Virginia work is largely confined to the 1000-foot, 1650-foot and 1750-foot levels. The upraise from the 1650-foot level to connect with the 1550-foot level is being closely watched. There are many who look for good results, while others again think they will not find much of an improvement over that already reported. Best & Belcher and Gould & Curry continue joint work to the east on the 800-foot Bonner shaft level. Fairly active work is being done by Savage on the levels heretofore published. In Hale & Norcross prospecting and dead work is confined to the 900-foot level. No work is being done by Chollar. In Potosi they are exploiting the old tunnel level. There is a possibility of finding, before long, enough ore to extract and mill. Bullion continues to push ahead the north drift from the 500-foot shaft level. It was started 2170 feet in to the west. No change is reported in Alpha workings. The joint west crossdrift of Confidence, Challenge and Con. Imperial is in softer formation, which admits of better

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progress. They expect to strike the west lode about 100 feet farther on. In Confidence the work is unchanged, as is that in Yellow Jacket, Crown Point, Belcher, Seg. Belcher, Overman and Alta.

On the Brunswick lode interest centers in Chollar, where they are working on the 200-foot, 300-foot, 400-foot and 500-foot levels. This work seems to be largely done for the purpose of extracting ore found on the first four and also developing the 500-foot to strike its downward continuation. They raise and mill each week enough ore to pay current expenses. In Occidental they are working on the levels heretofore published, without any material change in formation. Joint work is being done by Con. Virginia, Best & Belcher and Gould & Curry to develop the 300-foot level. They were putting in a chute at last advices.

The following illustrates the changes of the week:

MINES.	Jan. 28.	Feb. 4.
Alpha		
Alta Consolidated		$ 08
Andes	$ 15	14
Belcher	37	31
Best & Belcher	66	77
Bodie		
Bullion		
Challenge	54	50
Chollar	96	1 00
Confidence	1 25	
Consolidated California and Virginia	2 20	2 45
Consolidated New York		
Crown Point	30	33
Exchequer		
Gould & Curry	52	53
Hale & Norcross	1 25	
Justice		
Mexican	48	47
Ophir	1 15	1 05
Overman	14	
Potosi	55	53
Savage	50	49
Sierra Nevada	47	46
Union	43	40
Utah		
Yellow Jacket	37	32

San Francisco Stock Board Sales.

SAN FRANCISCO, February 4, 1897.

9:30 A. M. SESSION.

100 Alta	08	550 Crown Point	33
500 Andes	14	50 Mexican	46
800 Best & Belcher	73	800 Potosi	52
300 Caledonia	12	350 Savage	49
400 Chollar	98	50 Sierra Nevada	44
400 Con Cal & Va	1 20	300 Unlop	40

SECOND SESSION—2:30 P. M.

100 Ophir	1 05	300 Potosi	53
200 Mexican		47 300 Crown Point	32
500 Gould & Curry		53 900 Yellow Jacket	32
600 Best & Belcher		77 500 Belcher	31
700 Con Cal & Va	2	45 100 Sierra Nevada	46
700 Chollar	1	00 100 Challenge	50

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Rainfall and Temperature.

The following data for the week ending 5 A. M., February 3, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week	Total Seasonal Rainfall to Date	Total Seasonal Rainfall Last Year to Same Date	Average Seasonal Rainfall to Date	Maximum Temperature for the Week	Minimum Temperature for the Week
Eureka	2 82	26 74	24 73	25 43	62	46
Red Bluff	3 52	15 62	13 83	15 67	56	40
Sacramento	4 04	11 45	14.39	11.61	59	36
San Francisco	3 25	14 66	12 42	14 52	58	47
Fresno	2 32	7 05	4 09	3 66	64	38
San Luis Obispo	2 64	14 42	12 25		64	40
Los Angeles	2 52	10.93	5.91	12.44	62	44
San Diego	0.71	7 25	2.82	5 77	64	50
Yuma	0 04	4 66	.46	2 07	74	46

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DELINQUENT SALE NOTICE.

HARTMANN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Chili Gulch District, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 1) levied on the 22nd day of December, 1896, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
C. E. Stephens	2	3,000	150 00
H. Otersoen	6	2,500	125 00
J. P. G. Harrell	10	2,000	100 00
C. B. Schofield	14	2,000	100 00
C. C. Shepardson	9	3,390	169 50

And in accordance with law, and an order from the Board of Directors, made on the 22nd day of December, 1896, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, Room 46, No. 4 Montgomery street, San Francisco, California, on TUESDAY, the 23d day of February, 1897, at the hour of 5:30 o'clock P. M of said day, to pay said Delinquent Assessment thereon, together with costs of advertising and expenses of sale.

G W. PEER, Secretary.

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Assessment Notices.

MINERAL HILL MINING AND SMELTING CO.—Location of principal place of business, San Francisco, California; location of works, Spenceville, Nevada County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 4th day of January, 1897, an assessment (No. 1 of 10 cents per share was levied upon the whole of the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 210 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of February 1897, will be delinquent, and advertised for sale at public auction, and, unless payment is made before, will be sold on THURSDAY, the 25th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. PEACH, Secretary.

Office—210 Sansome street, San Francisco, California. Office hours from 1 to 3 o'clock P. M.

MARGUERITE GOLD MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of January, 1897, an assessment (No. 5) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 327 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 8th day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. PEACH, Secretary.

Office—327 12th street, San Francisco, California. Office hours from 1 to 3 o'clock P. M.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 13th day of January, 1897, an assessment (No. 5) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of February, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9), of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the 26th day of January, 1897, an assessment (No. 61) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on TUESDAY, the 23d day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room No. 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

ANDES SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia City, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of February, 1897, an assessment (No. 43) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 20 and 22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 3th day of March, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 31st day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

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The Argentaurum Papers,

No. 1.

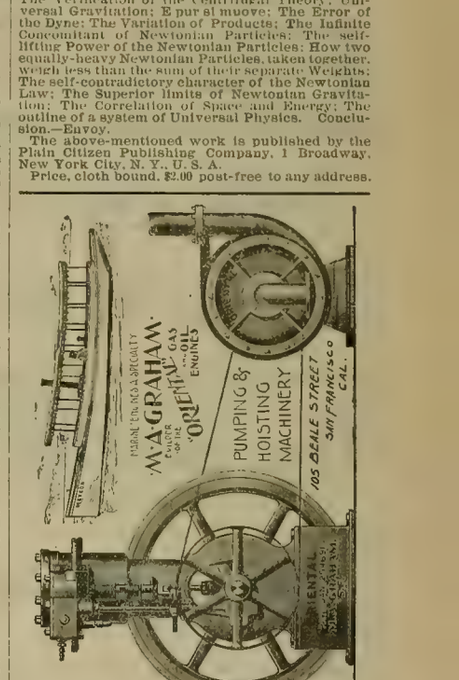
Some Remarks Concerning Gravitation.

By STEPHEN H. EMMENS.

CONTENTS.—Foreword: The Newtonian Doctrine; The Defect of Newton's Proof respecting the Centre of Force of a Spherical Shell; The Newtonian Demonstration respecting the Attraction exerted by Spheres upon External Bodies; An Inquiry as to the Reason of the Defect in the Newtonian Doctrine of Attracting Spheres having remained undiscovered until now; The Newtonian Doctrine of Internal Attractions; The Doctrine of Gravitating Centres as distinguished from Centres of Gravity; The Calculus of Gravitating Centres; The Gravitating Centre of a solid, homogeneous Sphere with relation to external bodies; The case of a Spheroid; The Precession of the Equinoxes; The Density of the Earth; The Internal Attractive Force of a Spherical Shell; The Internal Attractive Force of a Solid Sphere; The status of a Solid Sphere with regard to Internal Pressure; The Centrifugal Theory of Cosmical Bodies; The Variation of Density as regards the Earth's Crust; The Significance of Earthquakes; The Temperature of the Earth; The Source of Terrestrial Heat; The Source of Solar Heat; Saturn and Jupiter; The Volcanic Character and Quiescent Status of the Moon; The Obliquity of the Ecliptic; Elevation, Subsidence and Glacial Epochs; The Cooling and Shrinking of the Earth's Crust; The Arch Theory of the Earth's Crust; The cause of Ocean-beds and Mountains; Terrestrial Magnetism and Electricity; The Presence of Gold in the Ocean; The Verification of the Centrifugal Theory; Universal Gravitation; E pur si muove; The Error of the Dyne; The Variation of Products; The Infinite Concomitant of Newtonian Particles; The self-lifting Power of the Newtonian Particles; How two equally-heavy Newtonian Particles, taken together, weigh less than the sum of their separate Weights; The self-contradictory character of the Newtonian Law; The Superior limits of Newtonian Gravitation; The Correlation of Space and Energy; The outline of a system of Universal Physics. Conclusion.—Envoy.

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In regard to silming, in comparison with stamps, by reason of the discharge surface and the continuous agitation by the scrapers, a MUCH less amount of slime is created. A three years' experience teaches me that, in every respect, the mills are a complete success, and of material benefit to the mining world. They can be set up and running in forty-eight hours and can be dismounted in the same time and removed to wherever desired. Ours were packed on our mule trail over as difficult a road as any in Mexico. As a gold amalgamator it is unequaled by any mill now in existence. Yours truly,

D. M. BURNS, Superintendent.

BULLION-BECK AND CHAMPION MINING COMPANY,
EUREKA, UTAH, August 24, 1895.

THE RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: Referring to contract made by you with the Bullion-Beck and Champion Mining Company, by which you were to furnish one 5-foot Bryan Roller Quartz Mill on four months' trial, in competition with the Huntington Mill, would say that we have made the test, and the Bryan Mill has proven so greatly superior on all points claimed, viz., capacity and economy, that we have ordered a second Bryan Mill from you and have concluded to discontinue the use of the Huntington Mill.

Yours truly, JOHN BECK, Pres.

SIMON BAMBERGER, Director. [Copy.] W. J. BEATIE, Sec't'y.

BULLION-BECK AND CHAMPION MINING COMPANY,
EUREKA, UTAH, Aug. 24, 1895.

THE RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: In February last, in connection with the five-foot Bryan Roller Mill which we took from you to test in competition with the Huntington Mill, we also took a six-foot Johnston Concentrator to be tested with ten Frues, one end shake with four belts and one side shake Woodbury. We have been working these machines since the mill was completed, at such times when we had sufficient water.

The terms on which the test was made was that the machine doing the most satisfactory work should be accepted and the others taken out. This did not apply to the Frue, as they were purchased with the plant. In compliance with this agreement, we now inform you that the Johnston Concentrator has proved so superior over the other machines that we now order from you four more of the Johnston Concentrators. Yours truly, JOHN BECK, Pres.

SIMON BAMBERGER, Director. W. J. BEATIE, Sec't'y.

GREAT SALT LAKE AND HOT SPRINGS RAILWAY.
S. BAMBERGER, President and Manager.
SALT LAKE CITY, UTAH, October 10, 1895.

B. R. TAWNDRAW, ESQ., care Guyer Hot Springs, Ketchum, Idaho—Dear Sir: In reply to yours of the twenty-eighth of September, we have been using at the Bullion-Beck Concentrating Works, Frue Vanner, Woodbury and Johnston machines, side by side for the last four months; and after a thorough trial of all of them, we concluded that the Johnston Vanner was doing the most accurate work and was the best; hence, we bought four more Johnston machines and shall continue to use them in preference to any other.

You will find it the easiest regulated machine and very much easier set up than either of the other machines. We bought our machines from the Risdon Iron Works, of San Francisco, where Mr. Johnston, the patentee, personally superintends the manufacturing of them.

Hoping you will make a success, I remain, Yours truly,
[Copy.] [Signed] SIMON BAMBERGER.

THE GOLD VALLEY MINING COMPANY OF SAN FRANCISCO.
C. C. MCIVER, President; D. CUSHMAN, Secretary.
MISSION SAN JOSE, CAL., Oct. 17th, 1895.

RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: We take great pleasure in having to inform you that, after a careful investigation extending over a six weeks' steady run alongside of six other concentrators, the Johnston which you put in for us was the only machine from which you could not find a loss in the tailings. It has done all you claim for it and has proved more than satisfactory. We intend replacing all our other concentrators with Johnston's, as we are convinced they will pay for themselves many times over in a year. CHAS. C. McIVER, President.

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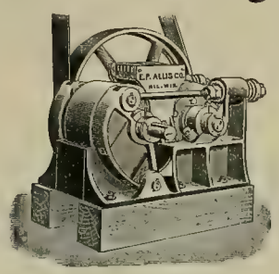
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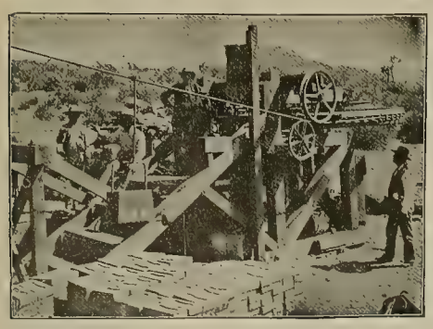
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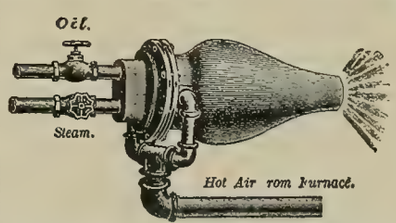
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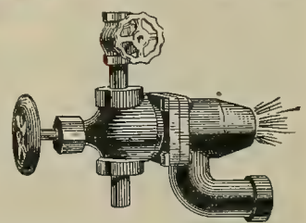
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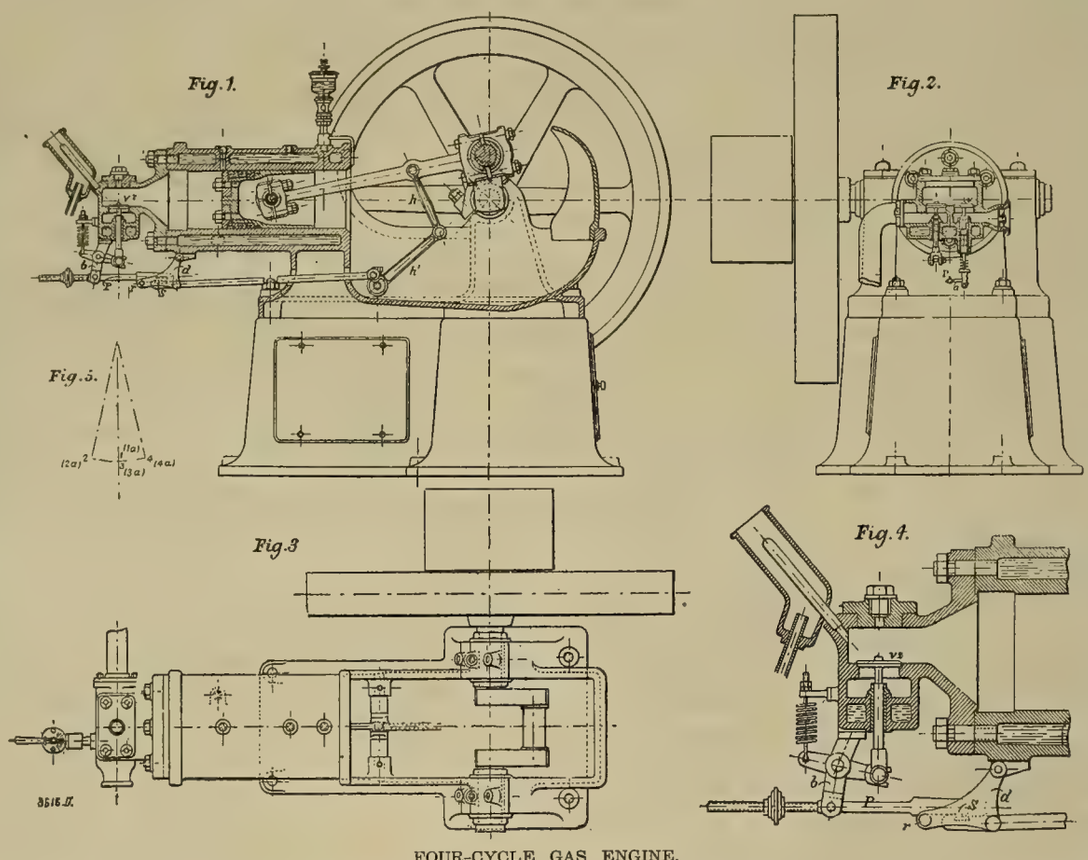
No. 1910.—VOLUME LXXIV. Number 7. SAN FRANCISCO, SATURDAY, FEBRUARY 13, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

A Successful Inventor.

After over thirty years of remarkable effort, A. B. Bowers has at last succeeded in securing absolute and undisturbed control of his patents for the famous hydraulic dredge to which he has devoted so much of his life and inventive genius. Last month the U. S. Circuit Court of Appeals rendered a decision confirming his claims to the original invention of the machine which has so long been a subject of litigation.

The fact that the invention itself was of immense practical value led to innumerable infringements and counter claims, and his success in devising such a machine caused a lifetime of warfare against those who combatted his claims to priority in that direction. Mr. Bowers has shown unusual tenacity and perseverance. No amount of financial embarrassment checked him in the steady prosecution of his suits. During the last ten years nearly everything began "coming his way," and he is at last in a position to dictate terms and acquire entire control of all that he has substantially claimed through all those years of struggle. The MINING AND SCIENTIFIC PRESS has in the last thirty years given so much prominence to his invention, and the progress of the litigation attendant thereon, that no more than the briefest chronicle of his final success is necessary. His career illustrates the trials of the even successful inventor: seldom have such trials resulted in so triumphant a result. In a two-page article written by him for this paper, and which appeared in our issue of Sept. 4th, 1880, Mr. Bowers discussed the troubles of inventors. That date was about his darkest hour; yet without impatience or bitterness he discussed the tendency to decry and belittle the projects of beneficial inventors, and hopefully writes: "These patient, persistent, investigating workers have a strange habit of succeeding at last. There are men who down at no one's bidding. They work on until they reach the ear of men of nerve and men of means, who are willing to listen and competent to judge, for there are such men who reason in this wise: This man appears to be moderately intelligent. There is about him no apparent evidence of insanity or imbecility. He has devoted much time and some money to the investigation of his subject and claims to understand it. After all this investigation it would be strange if he had not learned something. He may have hit upon something valuable. Such things have happened and may happen again. This would seem to be a reasonable view of the matter; but those who take this view are rare, and it is hard to find them. Great persistency, therefore, is necessary on the part of those who want to accomplish anything, however important, for which they, themselves, have not the requisite means."

Nearly seventeen years ago those words of Mr. Bowers, written in the shadow of struggle, appeared in this column, and now in the sunshine of his victory they appear prophetic.



FOUR-CYCLE GAS ENGINE.

BULLETIN No. 3 of the Minister of Mines of British Columbia—a report by William A. Carlyle, the provincial mineralogist, on the Slocan, Nelson and Ainsworth mining districts of West Kootenay—has been issued. The work done by the Government as to the new mining districts of British Columbia, while not elaborate nor very thorough, owing to the large ground to be covered, is timely and of value. The amount of gold and silver produced from the Kootenay mines, when it is considered that it is a new and comparatively undeveloped district opened up within a little over two years under great difficulties as to transportation, climate and rebellious character of the ores, speaks wonders for the future prospects of the country. This year promises to show a greater advance than ever, for many new and large mines are becoming producers.

Four-Cycle Gas Engine.

A. Borsig, of Berlin, shows at the Berlin Exhibition a four-cycle gas engine, noticeable, says the *American Manufacturer*, from the absence of toothed wheels or eccentrics. The general appearance of the engine, as shown in Figs. 1 to 3, follows the usual lines, but the valves are worked by a kind of radial gear $h\,h^1$, the principle of which is illustrated in Fig. 5, the diagram being from our Pittsburg contemporary. The path 1, 2, 3 of the die or catch s corresponds to the suction period; the path 3, 4, 1 to the compression period; the path $1a$, $2a$, $3a$ to the expansion period; and the path $3a$, $4a$, $1a$ to the period of exhaust.

During the period of suction, first cycle 1, 2, 3, the pendulum pawl P is lifted by the lateral projection a (Fig. 2) of the suction valve v; when the valve closes, P slowly falls back to be caught by the die s; on the path 3, 4, 1, s runs, therefore, idly. On the path $1a$, $2a$, $3a$, s slides under the corresponding edge of P, opening the exhaust valve v^2 while it follows in the path of $3a$, $4a$, $1a$. Thus the four-cycle is completed.

When the motor exceeds its speed, the pendulum pawl P is, by the action of the roller r of the suspension link d, thrown up too high, and falls in too late, missing s. The exhaust valve then remains closed; the expended mixture is once more compressed and expanded, and this play is repeated until the motor has regained its normal speed. Then the pendulum pawl will again act, the exhaust valve will be opened, the exhaust will escape, and suction again take place on the up-stroke, after which the normal conditions will continue.

At this time when the industrial world is giving so much attention to the subject of gas engines, the foregoing description, although brief, is particularly interesting. It seems that this type has several new features.

THERE have been in California within the past two years a number of engineers and owners of gravel mines in Russia looking into the methods in vogue here, and it is probable that within a very short time there will be a great change in the manner of working gravels in Siberia and the Caucasus. So far most of the mining has been done in a very crude way and at unnecessarily heavy expense for labor.

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J. F. HALLORAN.....General Manager

San Francisco, February 13, 1897.

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IN its issue of the 3rd inst. the greatest authority on advertising in this country says: "Many advertisers never learn that that which will pay them best may not be that which they like best. The best advertisers are those who cast prejudices and preferences aside, and utilize those methods which most effectively influence the public."

THE mineral land bill seems doomed to fail of passage by Congress at this session. But a few days remain and much business is before the House, and unless just pressure can be brought to bear upon the Speaker, and immediately, there is little hope of success. If it does fail, its passage at the next session will be of little value, for the lands in question are being so rapidly patented that there would be little work for the commission.

The Chinese and the Mines.

There has been considerable increase of late in the agitation against Chinese immigration in British Columbia. In Eastern Canada there is growing up more sympathy for the movement and petitions are being signed in Toronto, Montreal and Ottawa asking that a tax of $500 per capita be imposed on Chinese coming into the country. The greatest evil done by this nationality, from the standpoint of those interested in the mining industry, outside of the harm done to mining laborers, is through their taking up and working gravel mines and shipping the gold product out of the country. This they do, too, without making any large investments or doing development work that will be of lasting value or tend to improve the industry.

In California the Chinese have never been known to develop mines on a large scale or expend money that will be of value to the mining or other industries. Chinese miners' names are not on the books of the machinery and supply men of San Francisco. Yet, for the number of men of that race engaged in mining, probably they take out as much gold as do the whites.

Along the rivers and creeks of California, where there is auriferous gravel, particularly in Trinity, Siskiyou, Plumas and Placer, may be seen hundreds of Chinese working with small sluices, rockers or pans, upon ground that belongs yet to the Federal Government. They are squatters upon the public domain—aliens who, when they have gathered a few hundreds, will return to China.

Under the laws of the United States no one but a citizen, or one who has declared his intention to become one, may locate a mine. It has been suggested that the State Legislature pass an act providing some penalty for the working of mines that are not located. The enforcement of such a law would preserve these mines that, if not exhausted by the Chinese, would in time afford means of livelihood for part of our increasing population.

The Debris Bills.

An attempt is being made to show that there is asked from the California State Legislature for restraining dams and for dredgers nearly double what is really asked. There is now $250,000 in the State treasury appropriated by an act of March 24, 1893. To make this available the Legislature must amend the present law. Governor Budd pointed this out in his address to the last convention of the Miners' Association, and Controller Colgan, in a letter last Wednesday to Mr. Soward, author of the bill for the re-appropriation of the money, says that no part of this appropriation has been drawn from the State treasury, and the entire amount remains therein unexpended. He continues: "There appears to be no limitation as to the life of the appropriation. The only conditions surrounding it are that no warrant against it may be drawn or paid until the United States Government shall have appropriated an equal amount for a like purpose, and that the money is to be paid only upon orders drawn by the Controller upon the written request of the Debris Commissioner, and only for payment of not more than one-half of the cost of construction of works for restraining and impounding mining debris. It follows, therefore, that unless the law is amended or the office of Debris Commissioner is continued in existence, the appropriation could not be used, as no legal demand could be made upon the Controller."

And yet in the face of this it is claimed that $550,000 is being asked from the State.

There is being asked $300,000, and only that from this Legislature for caring for debris. As to this which is for dredging the Sacramento, it is urged that such work is the duty of the Federal Government. That is true, but the Federal Government refuses to act, and unless the State steps in, much more damage will soon be done than would be represented by the amount asked for.

However, California has had a good lesson from the appropriation of 1893 of the $250,000 for impounding dams. That was not so much proper work for the Federal Government as the dredging of the river, yet when the Legislature made the appropriation conditional upon a like appropriation from Congress, there was found little trouble in obtaining it.

If the State Legislature will now make the proposed appropriation of $300,000 for the dredging, there can be little question that Congress will do more in the future than it would if the bill fails to pass. In that way, from a financial point of view, it is safe to say that the State could make no better investment. An increased expenditure for the Sacramento river on the part of Congress will mean increased attention to the other needs of California in the way of caring for rivers and harbors.

The English Promoter.

Some time ago mention was made in these columns of a case of over-capitalization of a mine in Montana on the London market. For the stock £150,000 was asked, and of this £130,000 was to go to the vendors, promoters, etc., and £20,000 was for working capital on a mine without a mill or machinery and only £32,500 in ore in sight. Lately some Englishmen obtained an option on the War Eagle mine, in the Trail Creek district, British Columbia. The price was $1,000,000, or a little less. They failed to take the property, which has since been sold to a Canadian syndicate for about $800,000.

But the prospectus issued by the company formed in London—the War Eagle Mining Company—to take over the property called for £500,000, or nearly $2,500,000, for the vendors. This may be called a case of over-capitalization with a vengeance, or barefaced robbery. The War Eagle was well-developed, and the owners were not forced to sell nor desirous of selling unless they got a fair price. It is safe enough to presume that the mine was not worth more than they asked. Yet these London promoters calmly added 150 per cent to the price and made up a prospectus to fit a mine worth two and a half millions.

Had the London public been taken in, they would never have thought of blaming their own people, the promoters, but would have called down maledictions on the rascally Canadians.

Most of the trouble about the Australian mines has been caused by the greed of promoters in London, and yet Australians are the ones to suffer in the end from want of confidence on the part of capital in their properties. It is often asked why English capital is not more anxious to seek investment in California mines or properties in other old mining districts. It is simply because so many of those who place mines on the London market prefer to go to districts about which there is less information obtainable in order that the claims of their prospectors may not be too closely questioned.

Africa has been deserted by this class of promoters because the properties are too well known.

The State's Lands and Mining Claims.

Under the act of Congress of March 3, 1853, there was granted to the State of California the sixteenth and thirty-sixth sections in each township, which grant takes effect when these sections are identified by survey. There was no exception made in the act itself of the mineral lands, and it was held for many years by the State Supreme Court that the mineral lands passed to the State. However, later the United States Supreme Court overruled this interpretation of the law and upon the authority of its decision the State Supreme Court in 1891 reversed its former holding in the following language:

In Higgins v. Houghton, 25 Cal., 253, it was held by the Supreme Court of this State that mineral lands were not excepted from the operation of the grant of the sixteenth and thirty-sixth sections, made to the State by the act of March 3, 1853, and that as fast as the townships were surveyed the State became the owner of these sections absolutely. (And see Wedkind v. Craig, 56 Cal., 642.)

The rule declared by this court, as above stated, has not been approved by the Supreme Court of the United States. On the contrary, it was held by that court, in Mining Company v. Consolidated Mining Company, 102 U. S., 167, that the grant of the sixteenth and thirty-sixth sections of public land to the State of California, by the act of March 3, 1853, was not intended to cover mineral lands, but that such lands were, by the settled policy of the general government, excluded from all grants.

That decision is controlling, and must be followed here. The question then remains, Were the disputed premises, at the time of the grant, mineral lands—that is, known to be valuable for minerals? (Deffeback v. Hawke, 115 U. S., 404.)

Prior to this decision, the Legislature, assuming State ownership of the mineral school sections, provided for their sale by acts passed March 28, 1874, February 3, 1876, and April 6, 1880. Notwithstanding these later decisions, the State laws providing for the sale of mineral lands remain upon the statute books, and there is nothing to prevent the Surveyor-General from receiving an application and issuing a State title to lands which are not the property of the State.

The statutes are waste material and should be repealed. They may become the cause of confusion of titles. In fact, they have in the past.

Senator Stratton has introduced in the State Senate a bill providing for their repeal (Senate Bill No. 615), which was referred to the Committee on Mines, Drainage and Mining Debris, and has been by them favorably reported.

A Change of Policy.

Not so many years ago—1846—the reward meted out by the New South Wales, Australia, authorities to a convict who discovered gold was 100 lashes on the back. It was feared that if Australia became known as a gold-producing country it would be utterly spoiled as a receptacle for convicts. Now the paternal governments of the Colonies are doing more to encourage prospecting than any others in the world. Large sums in the way of bonus are offered by one for the discovery of new gold fields, government aid is offered in other cases for putting up mills and mining shafts on mines, it is proposed to erect a public crushing plant in New South Wales, and now comes the Minister for Mines of that colony suggesting that the Education department should establish classes in Sydney and other large towns for the instruction of prospectors, in order to enable them to determine on the spot the various minerals they may come across.

Concentrates.

THERE are employed in the mines about Baker City, Oregon, 1000 men.

IN the Colar gold fields of Mysore, India, the yield for 1896 was £1,251,738.

THE Comstock pay roll for January was $60,548 50—$1000 more than December.

THERE is a bill before the Utah Legislature to provide for a State Mine Inspector.

THE owners of the Thorpe mine, in Calaveras county, Cal., propose to put up a 10-stamp mill and a cyanide plant

DURING the twelve years of its existence the Broken Hill field has produced silver and lead to the value of £22,540,000.

THE Stockton company which owns the Arbona mine at Tuttletown, Tuolumne county, Cal., intends putting up a 10-stamp mill.

THE movement to incorporate the town of Rossland, British Columbia, promises to succeed, as the government of Canada promises support.

ACCORDING to the Denver *Republican* the output of Cripple Creek, Colorado for January was $1,350,000, against $700,000 for January, 1896.

MEN are looking over the ground on Rogue river, Southern Oregon, with a view to putting in a dredging plant to work the auriferous gravels.

A TELEGRAM from Guthrie, Oklahoma, announces that a detachment of troops had arrested a number of miners at work in the Wichita mountains.

R. A. F. PENROSE JR. of Colorado Springs, Colo., will soon begin the erection of a 40-stamp mill in Sulphur Spring Valley, Arizona, near Wilcox.

THE Nelson *Tribune* estimates the population of West Kootenay, including Nelson, Ainsworth, Slocan, Trail and Revelstoke districts, at about 16,000.

THE Mount Morgan mine of Australia, during the six months ending Nov. 30th last, produced 56,295 tons of ore, from which 75,506 ounces of gold were obtained.

F. AUGUST HEINZE is arranging for the extension of the Columbia & Western Railway, running into British Columbia, westward to the Okanogan country.

AT the last reports on the Robinson Deep in the Rand, South Africa, a shaft had reached a depth of 2137 feet. The distance sunk in the month of November was 73 feet.

SINCE D. H. Moffat and others have obtained control of the property they have announced their intention of again starting the Deep shaft on Aspen mountain, Colo.

AT the Royal Mint, Melbourne, for the week ending January 9th, 1897, the gold received was 80,329 ounces, and the value of gold coin and bullion issued was £121,669.

THE California Exploration Company have offered to bond the Good Hope mine, near the Gwin mine, in Calaveras county, Cal., from the owner, Harry Howarth, for $40,000.

NEAR Elizabethtown, New Mexico, there have been made discoveries of gold ore, and it is claimed that 75 pounds from the Black Copper mine assayed at the rate of $100,000 a ton.

IN the new copper properties near Goleonda, Nevada, the English people who have them under bond employ 45 men, and the developments made indicate that they will take the mine.

ON the W. Y. O. D. mine in Nevada county, Cal., a tunnel 475 feet long, 7 feet high, 4 feet wide on the bottom and 3 feet on top, was run between December 27th last and February 3rd.

MANY new strikes made in Cripple Creek during the past two months have enlivened the camp very much. The chief need is for greater milling capacity for the treatment of low-grade ores.

AMERICAN concessionaries who went into the Corean gold fields some months ago are well pleased with the outlook and are erecting a mill and making other arrangements to work on a large scale.

THE Mountain Copper Company, at Keswick, California, has bonded the Utah Consolidated, in Old Diggings district, Shasta county, which contains a large ledge that has resisted economical treatment by ordinary methods.

THE monthly statement of the Alaska-Mexican Gold Mining Company for December shows: Bullion shipment, $27,170; ore milled, 10,572 tons; sulphurets treated, 147 tons. Of bullion there came from sulphurets $6661; working expenses for period, $20,664.

THE Bodie, Cal., *Index* states that Cain & McCone are working ore at the Bodie tunnel mill at a cost of about $2 per ton, and that if they could do away with the fuel expense by the introduction of electric power the cost of milling would hardly exceed $1 per ton.

MOST of the big mines in the Slocan and Kaslo districts in British Columbia have contracted for their ore for some time, and the bulk of it will go to American smelters. The ore in the Ainsworth district is being sold on short contracts, and most of it comes over the line.

THE coast cities of British Columbia are agitating the question of building smelters and securing direct railway communication with the Kootenay country, in order to prevent all the trade from going to eastern Canada over the Canadian Pacific or to the United States.

A LONDON syndicate has been given an option to deposit $100,000 in bank at Spokane, Wash., for the purpose of purchasing the Le Roi mine in British Columbia for something over $4,000,000. In case they fail to accept, another English syndicate will be given an option.

SALT LAKE capitalists are figuring on putting up a smelter at Vancouver, British Columbia, in conjunction with people from Portland, Oregon. Proposed smelters have been located in many places in the Northwest, but the railroad builders will determine which shall be put up.

AT a meeting of the miners of Randsburg district, Kern county, California, last week they passed a set of strong resolutions condemning malicious claim-jumping, and announcing that it would no longer be tolerated. These claim-jumpers have been doing much harm by destroying confidence in titles.

THE British Columbia cinnabar mines are giving promise of turning out well. The British Columbia Cinnabar Company, which controls the largest property, has had a force of 25 men at work during the winter and is erecting furnaces. They have been developing the property for two years and have extracted 120 flasks of quicksilver.

THE Spokane papers are advocating the opening up of the south half of the Colville, Wash., Reservation. At present this acts as an impassable barrier to the Okanogan mines. It is claimed that its opening will mean not only opening up of 3,000,000 acres of land in the reservation, but practically of a larger country beyond, by allowing railroads to be built.

THE Helena and Frisco Company, a majority of whose stock was lately purchased by the Exploration Company, will soon be reorganized. The property is located in Idaho, the company is incorporated under the laws of Montana, and it is proposed now to form the new incorporation under the laws of West Virginia

EASTERN capitalists have been in Santa Fé county, New Mexico, lately, negotiating for the purchase of 60,000 acres of land known as the Ortiz mine grant, and owned by Senator Elkins of West Virginia, R. C. Kerens of St. Louis and others. The property contains gold mines, some of the workings being over 100 years old.

IN the San Carlos reservation, Arizona, since the segregation of part of the land, considerable prospecting has been done and several mining camps have been started. The ore is mostly copper carrying gold. In one district, where large bodies of galena ore have been discovered, there are evidences of work having been done many decades ago.

IT is proposed to establish in Auckland, New Zealand, a mining bank, but the plan has never been figured out in detail. During the boom times in Broken Hill, Australia, in the eighties, the branches of all the big banks loaned money on shares, but this has ceased. It is suggested that the proposed bank advance on "margins," as do the brokers.

AT Otago, New Zealand, the Roxburgh Amalgamated Company six years ago put in two hydraulic elevators to work auriferous gravels, and now have five in operation. The company have within the six years of their existence worked about twenty-five acres. In that time they have taken out 10,776 ounces of gold, equal in value to $200,000.

AN evidence of the value to any new mining district of railway competition is furnished in the Northwest. Upon the opening up of the mines of British Columbia, the American roads hastened to form connections, and these are afforded splendid facilities for shipping ore. Want of competition in Canada has given the business to the competing Americans.

IT has been demonstrated that the siliceous ore belt in the Black Hills, South Dakota, extends from Nigger hill, in the Bear gulch country, to Custer Peak, a distance of sixty-six miles from northwest to southeast, and from Crook mountain on the northeast to Spearfish creek on the southwest, a distance of thirty-five miles; and yet outside of this scope of country numerous prospectors are at work.

A DIVIDEND has been paid by a mine in the new Lake of the Woods district in Ontario, Canada. The local press gives the following account of it: "The Golden Gate Mining Company directors met this afternoon and declared a dividend of 50 per cent. This is the first company operating in the Lake of the Woods to declare a dividend. The money was made, not by working the mine, but by a sale to an Englishman named Laycock."

THE reports of the Union Pacific railroad as to shipments of ores in Utah show a heavy increase over last year. The most striking increase for the last week in January was in the amount of silver and lead ore, the record showing that during the week covered by the report 48 carloads were shipped, as compared with 23 cars in 1896. During the same period the same company handled 23 cars of silver and lead bullion, 2 carloads of copper bullion, 1 car of copper matte, and 9 cars of concentrates.

A TELEGRAM from Nelson, British Columbia, states that the exports of mineral from Kootenay for January, as declared at the Nelson custom house, were: Ore, 3402 tons, value $258,779; matte, 1141 tons, value $416,727; total value, $675,506. Eight hundred and fifty-two tons are reported as being shipped via Nakusp and Revelstoke, worth at least $85,200, bringing the total for the month up to $760,706, and making the exports for the two months, December and January, considerably over a million dollars.

AN association composed entirely of mining men has been formed at Nelson, British Columbia, for the purpose of supervising all legislation relating to mining matters especially, and considering other subjects of interest to the industry. Late last session of the Legislature a clause was hurriedly inserted into the mineral act, depriving miners of the right, which they had previously enjoyed, of cutting timber for mining purposes anywhere on Crown lands. Efforts will be made to put this matter on the original basis.

J. M. HARRIS, a man now about 30 years of age, went from the Cœur d'Alene country to the Slocan, in British Columbia, in 1892 and purchased a prospect, the Reco. February 1st the Reco Mining Company declared a dividend of $100,000. J. M. Harris, who was elected president and manager, stated: "Previous to incorporation the mine paid in dividends $37,500 and $150,000 in development, and shipped nearly $200,000 worth of ore. We claim $3,000,000 worth of ore in sight to-day."

NOW that there is such an increased demand for copper, prospecting for mines is going on more actively than ever. Many of the known deposits which have not of late been worked, owing to the price and low grade of the ore, are again being exploited. This is particularly true in Arizona. In the mountains about Tucson there are known to be many bodies of ore. A great advantage the prospector has nowadays over the man who went out a few years ago is the fact that he is better equipped for determining the value of what he finds.

AS to the late boom in West Australian mining stocks the Sydney *Daily Telegraph* says: "We can promise London folk that shortly there will be exposures which will edify them. They will learn, for example, that a mine of which the present market value on the London Stock Exchange is over £160,000 has had two big crushings in succession which have returned 3 dwt. and 4 dwt. per ton, and that the information has been withheld from the shareholders, who have been led to believe that the battery has been idle pending additions and alterations."

SOME of the gravel miners along the streams in Siskiyou county, Cal., are becoming interested in a scoop or dredging apparatus lately invented for working gulch and creek bed claims, where the bedrock is deep. It is simply a scoop guided by a slanting cable, extending 100 feet or more in length, to bottom of diggings, 30 to 50 feet deep in an open cut. This method, it is claimed, does away with the use of derrick or pump, as the scoop will take up gravel and water to the extent of over a ton each load, and can be worked rapidly with one man at the engine and two more in the cut, doing the work of a dozen or more men under the old system.

ACCORDING to the report of the Princess Estate and Gold Mining Company, Limited, of Johannesburg, South Africa, during the last year they treated by the cyanide process 83,662 tons, 75 per cent of the tonnage crushed. During the first four months the percentage of gold extraction was only 60.46 per cent of the gold contents of the ore, vegetable matter having had a deleterious influence on the cyanide solutions. In the last eight months, whenever clean sands were treated, the actual percentage of extraction rose to 71.8 per cent, and ultimately 75 per cent.

SHAFT SINKERS on the Amador Queen No. 1 at Jackson, Amador county, Cal., owned by the Jackson Exploration and Development Company, Limited, claim a record. The shaft is being sunk by contract, three eight-hour shifts of two men each being employed. Sam Harvey is the contractor and attends to the timbering, his partners being J. Kitto (who, in conjunction with Harvey, won the drilling contest championship in 1895), John Fox, Hart Roberts, Sam Harris, J. Staples and Joe Jefford. During the month of January, 1897, after being hampered by a sudden influx of water for two or three days, this crew of men sunk and timbered the shaft 85 feet. The shaft is 9x5 feet within timbers, 12x12 timbers being used, and is in granite.

IN the Aspen, Colorado, district the managers and owners of all the large properties have agreed to reduce the scale of royalties exacted from leasing miners in amount to correspond to reductions promised in freight by the railroad companies. The agreement as drafted states that the owners and leasers of mines in the vicinity of Aspen, realising that the mines contain large bodies of low-grade silver ores, which cannot be mined and marketed at a profit under existing railroad transportation and royalty rates, and knowing that a reduction in these rates would greatly increase the output of ore and furnish employment to a large number of men and thus add to the general prosperity of the city and county, agree to the reduction proposed.

A PARTY of miners, who had left Circle City, on the Yukon, Alaska, Nov. 18th, arrived at Dyea, on the southeast Alaskan coast, Jan. 28th. They report that a number of new strikes have been made on the Yukon. Of course, those who will gain the most are the men who have gone in prepared to make a long stay and carry themselves over a season or two. The newcomers of this summer need not expect that they can take advantage of the discoveries made without money. Yet, from all reports, in spite of the many difficulties of climate, transportation and shortness of supplies, men of experience, with provisions and money to carry them over for from two to three seasons, will find more than the usual opportunities for making a stake. But more unheeded advice has been given and will be given about Alaska than many less remote and more accessible districts. The usual rush of inexperienced tenderfeet, without means of subsistence, will go north in a few months.

THE following subjects for consideration have been suggested to the British Columbia Legislature by the *Mining Record* of Victoria, B. C.: Liberal appropriations for roads and trails; better police protection; amendments to the law relating to mining incorporations for the better protection of investors and the checking of over-capitalization of companies; a re-arrangement of mining recorders' offices, so as to give prospectors and others the least amount of trouble in recording claims; amendments to the act relating to the incorporation of towns; a liberal policy towards railway extension and to aid new railways; a strict scrutiny of all applications for railway charters; a liberal appropriation for advertising the mineral resources of the province and the publication of much needed maps of mining districts; abolishing working miners' licenses; an act to compel all mining companies doing business in this province, and incorporated under the laws of the State of Washington or elsewhere, to re-incorporate under the laws of British Columbia.

THE Slocan, British Columbia, district, with an area of about 15 by 25 miles, according to W. A. Carlyle, the government geologist, produced in 1896 18,215 tons of ore, which yielded 2,141,088 ounces of silver, and 19,210,666 pounds of lead or an average of 117.4 ounces of silver per ton and 52.7 per cent lead, giving a net profit of $75 per ton. Many carloads of ore shipped yielded as high as 300 and 400 ounces of silver per ton. The Slocan Star, which has the largest chute of high-grade ore in the district, received from the smelters from 11,529 tons of ore and concentrates sold during the last three years 912,000 ounces of silver and 13,482,000 pounds of lead. The mines shipping during the past season in the three districts were: Slocan, 42; Nelson, 4; Ainsworth, 9. The miners at work were: Slocan, 1000; Ainsworth, 200; Nelson, 350. The ore shipped was: Slocan, 2,816,561 ounces of silver, 17,778,884 pounds of lead, value $2,085,445, against $942,094 in 1895; Nelson, 586,143 ounces of silver and 2,010,294 pounds of lead, value $493,225, against $38,120 in 1895; Ainsworth, 203,897 ounces of silver and 2,476,972 pounds of lead, value $210,918, against $384,677 in 1895.

W. F. KENDRICK of Colorado directs attention to a new feature in the smelting interests of Denver and Pueblo—the shipping of ore, carrying heavy in lead as well as gold and silver, from the mines of British Columbia in bond through the United States to the Gulf of Mexico and thence by British steamers to Liverpool, the ore being smelted at Denver and Pueblo while in bond during transit. The ore carries upward of 60 per cent in lead, on which account the lead trust, it is claimed, tried to freeze out the English owners of the great silver and lead mines of British Columbia by declining to buy the output of the mines. That district is so far from the European market that the freight rates were heavily against them, so much so that the lead contained in their ore was of little commercial value. As the ore enters the United States boundary, it comes under charge of United States custom officials, and in this way is transported to the smelting works, where it is placed in bond warehouses, smelted, refined, the lead bullion shipped by rail to Galveston, thence by steamer to Liverpool, from 100 to 200 tons per day being handled in that way. It is claimed that the amount of lead that can be produced from these British Columbia mines would overstock the market and cause heavy loss to the trust, and the mine owners of that district, to protect themselves, formed a strong syndicate, which has been able to make arrangements with the railroad reaching the Gulf on terms enabling them to market their lead in Liverpool, distant from their mines by the route taken equal to over one-third the circumference of the globe.

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J. F. HALLORAN.....General Manager

San Francisco, February 13, 1897.

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In its issue of the 3rd inst. the greatest authority on advertising in this country says: "Many advertisers never learn that that which will pay them best may not be that which they like best. The best advertisers are those who cast prejudices and preferences aside, and utilize those methods which most effectively influence the public."

The mineral land bill seems doomed to fail of passage by Congress at this session. But a few days remain and much business is before the House, and unless just pressure can be brought to bear upon the Speaker, and immediately, there is little hope of success. If it does fail, its passage at the next session will be of little value, for the lands in question are being so rapidly patented that there would be little work for the commission.

The Chinese and the Mines.

There has been considerable increase of late in the agitation against Chinese immigration in British Columbia. In Eastern Canada there is growing up more sympathy for the movement and petitions are being signed in Toronto, Montreal and Ottawa asking that a tax of $500 per capita be imposed on Chinese coming into the country. The greatest evil done by this nationality, from the standpoint of those interested in the mining industry, outside of the harm done to mining laborers, is through their taking up and working gravel mines and shipping the gold product out of the country. This they do, too, without making any large investments or doing development work that will be of lasting value or tend to improve the industry.

In California the Chinese have never been known to develop mines on a large scale or expend money that will be of value to the mining or other industries. Chinese miners' names are not on the books of the machinery and supply men of San Francisco. Yet, for the number of men of that race engaged in mining, probably they take out as much gold as do the whites.

Along the rivers and creeks of California, where there is auriferous gravel, particularly in Trinity, Siskiyou, Plumas and Placer, may be seen hundreds of Chinese working with small sluices, rockers or pans, upon ground that belongs yet to the Federal Government. They are squatters upon the public domain—aliens who, when they have gathered a few hundreds, will return to China.

Under the laws of the United States no one but a citizen, or one who has declared his intention to become one, may locate a mine. It has been suggested that the State Legislature pass an act providing some penalty for the working of mines that are not located. The enforcement of such a law would preserve these mines that, if not exhausted by the Chinese, would in time afford means of livelihood for part of our increasing population.

The Debris Bills.

An attempt is being made to show that there is asked from the California State Legislature for restraining dams and for dredgers nearly double what is really asked. There is now $250,000 in the State treasury appropriated by an act of March 24, 1893. To make this available the Legislature must amend the present law. Governor Budd pointed this out in his address to the last convention of the Miners' Association, and Controller Colgan, in a letter last Wednesday to Mr. Soward, author of the bill for the re-appropriation of the money, says that no part of this appropriation has been drawn from the State treasury, and the entire amount remains therein unexpended. He continues: "There appears to be no limitation as to the life of the appropriation. The only conditions surrounding it are that no warrant against it may be drawn or paid until the United States Government shall have appropriated an equal amount for a like purpose, and that the money is to be paid only upon orders drawn by the Controller upon the written request of the Debris Commissioner, and only for payment of not more than one-half of the cost of construction of works for restraining and impounding mining debris. It follows, therefore, that unless the law is amended or the office of Debris Commissioner is continued in existence, the appropriation could not be used, as no legal demand could be made upon the Controller."

And yet in the face of this it is claimed that $550,000 is being asked from the State.

There is being asked $300,000, and only that from this Legislature for caring for debris. As to this which is for dredging the Sacramento, it is urged that such work is the duty of the Federal Government. That is true, but the Federal Government refuses to act, and unless the State steps in, much more damage will soon be done than would be represented by the amount asked for.

However, California has had a good lesson from the appropriation of 1893 of the $250,000 for impounding dams. That was not so much proper work for the Federal Government as the dredging of the river, yet when the Legislature made the appropriation conditional upon a like appropriation from Congress, there was found little trouble in obtaining it.

If the State Legislature will now make the proposed appropriation of $300,000 for the dredging, there can be little question that Congress will do more in the future than it would if the bill fails to pass. In that way, from a financial point of view, it is safe to say that the State could make no better investment. An increased expenditure for the Sacramento river on the part of Congress will mean increased attention to the other needs of California in the way of caring for rivers and harbors.

The English Promoter.

Some time ago mention was made in these columns of a case of over-capitalization of a mine in Montana on the London market. For the stock £150,000 was asked, and of this £130,000 was to go to the vendors, promoters, etc., and £20,000 was for working capital on a mine without a mill or machinery and only £32,500 in ore in sight. Lately some Englishmen obtained an option on the War Eagle mine, in the Trail Creek district, British Columbia. The price was $1,000,000, or a little less. They failed to take the property, which has since been sold to a Canadian syndicate for about $800,000.

But the prospectus issued by the company formed in London—the War Eagle Mining Company—to take over the property called for £500,000, or nearly $2,500,000, for the vendors. This may be called a case of over-capitalization with a vengeance, or barefaced robbery. The War Eagle was well-developed, and the owners were not forced to sell nor desirous of selling unless they got a fair price. It is safe enough to presume that the mine was not worth more than they asked. Yet these London promoters calmly added 150 per cent to the price and made up a prospectus to fit a mine worth two and a half millions.

Had the London public been taken in, they would never have thought of blaming their own people, the promoters, but would have called down maledictions on the rascally Canadians.

Most of the trouble about the Australian mines has been caused by the greed of promoters in London, and yet Australians are the ones to suffer in the end from want of confidence on the part of capital in their properties. It is often asked why English capital is not more anxious to seek investment in California mines or properties in other old mining districts. It is simply because so many of those who place mines on the London market prefer to go to districts about which there is less information obtainable in order that the claims of their prospectors may not be too closely questioned.

Africa has been deserted by this class of promoters because the properties are too well known.

The State's Lands and Mining Claims.

Under the act of Congress of March 3, 1853, there was granted to the State of California the sixteenth and thirty-sixth sections in each township, which grant takes effect when these sections are identified by survey. There was no exception made in the act itself of the mineral lands, and it was held for many years by the State Supreme Court that the mineral lands passed to the State. However, later the United States Supreme Court overruled this interpretation of the law and upon the authority of its decision the State Supreme Court in 1891 reversed its former holding in the following language:

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Senator Stratton has introduced in the State Senate a bill providing for their repeal (Senate Bill No. 615), which was referred to the Committee on Mines, Drainage and Mining Debris, and has been by them favorably reported.

A Change of Policy.

Not so many years ago—1846—the reward meted out by the New South Wales, Australia, authorities to a convict who discovered gold was 100 lashes on the back. It was feared that if Australia became known as a gold-producing country it would be utterly spoiled as a receptacle for convicts. Now the paternal governments of the Colonies are doing more to encourage prospecting than any others in the world. Large sums in the way of bonus are offered by one for the discovery of new gold fields, government aid is offered in other cases for putting up mills and mining shafts on mines, it is proposed to erect a public crushing plant in New South Wales, and now comes the Minister for Mines of that colony suggesting that the Education department should establish classes in Sydney and other large towns for the instruction of prospectors, in order to enable them to determine on the spot the various minerals they may come across.

Concentrates.

THERE are employed in the mines about Baker City, Oregon, 1000 men.

IN the Colar gold fields of Mysore, India, the yield for 1896 was £1,251,738.

THE Comstock pay roll for January was $60,548 50—$1000 more than December.

THERE is a bill before the Utah Legislature to provide for a State Mine Inspector.

THE owners of the Thorpe mine, in Calaveras county, Cal., propose to put up a 10-stamp mill and a cyanide plant.

DURING the twelve years of its existence the Broken Hill field has produced silver and lead to the value of £22,540,000.

THE Stockton company which owns the Arbona mine at Tuttletown, Tuolumne county, Cal., intends putting up a 10-stamp mill.

THE movement to incorporate the town of Rossland, British Columbia, promises to succeed, as the government of Canada promises support.

ACCORDING to the Denver *Republican* the output of Cripple Creek, Colorado for January was $1,350,000, against $700,000 for January, 1896.

MEN are looking over the ground on Rogue river, Southern Oregon, with a view to putting in a dredging plant to work the auriferous gravels.

A TELEGRAM from Guthrie, Oklahoma, announces that a detachment of troops had arrested a number of miners at work in the Wichita mountains.

R. A. F. PENROSE JR. of Colorado Springs, Colo., will soon begin the erection of a 40-stamp mill in Sulphur Spring Valley, Arizona, near Wilcox.

THE Nelson *Tribune* estimates the population of West Kootenay, including Nelson, Ainsworth, Slocan, Trail and Revelstoke districts, at about 16,000.

THE Mount Morgan mine of Australia, during the six months ending Nov. 30th last, produced 56,298 tons of ore, from which 75,506 ounces of gold were obtained.

F. AUGUST HEINZE is arranging for the extension of the Columbia & Western Railway, running into British Columbia, westward to the Okanogan country.

AT the last reports on the Robinson Deep in the Rand, South Africa, a shaft had reached a depth of 2137 feet. The distance sunk in the month of November was 73 feet.

SINCE D. H. Moffat and others have obtained control of the property they have announced their intention of again starting the Deep shaft on Aspen mountain, Colo.

AT the Royal Mint, Melbourne, for the week ending January 9th, 1897, the gold received was 80,829 ounces, and the value of gold coin and bullion issued was £121,669.

THE California Exploration Company have offered to bond the Good Hope mine, near the Gwin mine, in Calaveras county, Cal., from the owner, Harry Howarth, for $40,000.

NEAR Elizabethtown, New Mexico, there have been made discoveries of gold ore, and it is claimed that 75 pounds from the Black Copper mine assayed at the rate of $100,000 a ton.

IN the new copper properties near Golconda, Nevada, the English people who have them under bond employ 45 men, and the developments made indicate that they will take the mine.

ON the W. Y. O. D. mine in Nevada county, Cal., a tunnel 475 feet long, 7 feet high, 4 feet wide on the bottom and 3 feet on top, was run between December 27th last and February 3rd.

MANY new strikes made in Cripple Creek during the past two months have enlivened the camp very much. The chief need is for greater milling capacity for the treatment of low-grade ores.

AMERICAN concessionaries who went into the Corean gold fields some months ago are well pleased with the outlook and are erecting a mill and making other arrangements to work on a large scale.

THE Mountain Copper Company, at Keswick, California, has bonded the Utah Consolidated, in Old Diggings district, Shasta county, which contains a large ledge that has resisted economical treatment by ordinary methods.

THE monthly statement of the Alaska-Mexican Gold Mining Company for December shows: Bullion shipment, $27,170; ore milled, 10,572 tons; sulphurets treated, 147 tons. Of bullion there came from sulphurets $6661; working expenses for period, $20,664.

THE Bodie, Cal., *Index* states that Cain & McCone are working ore at the Bodie tunnel mill at a cost of about $2 per ton, and that if they could do away with the fuel expense by the introduction of electric power the cost of milling would hardly exceed $1 per ton.

MOST of the big mines in the Slocan and Kaslo districts in British Columbia have contracted for their ore for some time, and the bulk of it will go to American smelters. The ore in the Ainsworth district is being sold on short contracts, and most of it comes over the line.

THE coast cities of British Columbia are agitating the question of building smelters and securing direct railway communication with the Kootenay country, in order to prevent all the trade from going to eastern Canada over the Canadian Pacific or to the United States.

A LONDON syndicate has been given an option to deposit $100,000 in bank at Spokane, Wash., for the purpose of purchasing the Le Roi mine in British Columbia for something over $4,000,000. In case they fail to accept, another English syndicate will be given an option.

SALT LAKE capitalists are figuring on putting up a smelter at Vancouver, British Columbia, in conjunction with people from Portland, Oregon. Proposed smelters have been located in many places in the Northwest, but the railroad builders will determine which shall be put up.

AT a meeting of the miners of Randsburg district, Kern county, California, last week they passed a set of strong resolutions condemning malicious claim-jumping, and announcing that it would no longer be tolerated. These claim-jumpers have been doing much harm by destroying confidence in titles.

THE British Columbia cinnabar mines are giving promise of turning out well. The British Columbia Cinnabar Company, which controls the largest property, has had a force of 25 men at work during the winter and is erecting furnaces. They have been developing the property for two years and have extracted 120 flasks of quicksilver.

THE Spokane papers are advocating the opening up of the south half of the Colville, Wash., Reservation. At present this acts as an impassable barrier to the Okanogan mines. It is claimed that its opening will mean not only opening up of 3,000,000 acres of land in the reservation, but practically of a larger country beyond, by allowing railroads to be built.

THE Helena and Frisco Company, a majority of whose stock was lately purchased by the Exploration Company, will soon be reorganized. The property is located in Idaho, the company is incorporated under the laws of Montana, and it is proposed now to form the new incorporation under the laws of West Virginia.

EASTERN capitalists have been in Santa Fe county, New Mexico, lately, negotiating for the purchase of 60,000 acres of land known as the Ortiz mine grant, and owned by Senator Elkins of West Virginia, R. C. Kerens of St. Louis and others. The property contains gold mines, some of the workings being over 100 years old.

IN the San Carlos reservation, Arizona, since the segregation of part of the land, considerable prospecting has been done and several mining camps have been started. The ore is mostly copper carrying gold. In one district, where large bodies of galena ore have been discovered, there are evidences of work having been done many decades ago.

IT is proposed to establish in Auckland, New Zealand, a mining bank, but the plan has never been figured out in detail. During the boom times in Broken Hill, Australia, in the eighties, the branches of all the big banks loaned money on shares, but this has ceased. It is suggested that the proposed bank advance on "margins," as do the brokers.

AT Otago, New Zealand, the Roxburgh Amalgamated Company six years ago put in two hydraulic elevators to work auriferous gravels, and now have five in operation. The company have within the six years of their existence worked about twenty-five acres. In that time they have taken out 10,776 ounces of gold, equal in value to $200,000.

AN evidence of the value to any new mining district of railway competition is furnished in the Northwest. Upon the opening up of the mines of British Columbia, the American roads hastened to form connections, and these are afforded splendid facilities for shipping ore. Want of competition in Canada has given the business to the competing Americans.

IT has been demonstrated that the siliceous ore belt in the Black Hills, South Dakota, extends from Nigger hill, in the Bear gulch country, to Custer Peak, a distance of sixty-six miles from northwest to southeast, and from Crook mountain on the northeast to Spearfish creek on the southwest, a distance of thirty-five miles; and yet outside of this scope of country numerous prospectors are at work.

A DIVIDEND has been paid by a mine in the new Lake of the Woods district in Ontario, Canada. The local press gives the following account of it: "The Golden Gate Mining Company directors met this afternoon and declared a dividend of 50 per cent. This is the first company operating in the Lake of the Woods to declare a dividend. The money was made, not by working the mine, but by a sale to an Englishman named Laycock."

THE reports of the Union Pacific railroad as to shipments of ores in Utah show a heavy increase over last year. The most striking increase for the last week in January was in the amount of silver and lead ore, the record showing that during the week covered by the report 48 carloads were shipped, as compared with 23 cars in 1896. During the same period the same company handled 23 cars of silver and lead bullion, 2 carloads of copper bullion, 1 car of copper matte, and 9 cars of concentrates.

A TELEGRAM from Nelson, British Columbia, states that the exports of mineral from Kootenay for January, as declared at the Nelson custom house, were: Ore, 3402 tons, value $258,779; matte, 1141 tons, value $416,727; total value, $675,506. Eight hundred and fifty-two tons are reported as being shipped via Nakusp and Revelstoke, worth at least $85,200, bringing the total for the month up to $760,706, and making the exports for the two months, December and January, considerably over a million dollars.

AN association composed entirely of mining men has been formed at Nelson, British Columbia, for the purpose of supervising all legislation relating to mining matters especially, and considering other subjects of interest to the industry. Late last session of the Legislature a clause was hurriedly inserted into the mineral act, depriving miners of the right, which they had previously enjoyed, of cutting timber for mining purposes anywhere on Crown lands. Efforts will be made to put this matter on the original basis.

J. M. HARRIS, a man now about 30 years of age, went from the Cœur d'Alene country to the Slocan, in British Columbia, in 1892 and purchased a prospect, the Reco. February 1st the Reco Mining Company declared a dividend of $100,000. J. M. Harris, who was elected president and manager, stated: "Previous to incorporation the mine paid in dividends $37,500 and $150,000 in development, and shipped nearly $200,000 worth of ore. We claim $3,000,000 worth of ore in sight to-day."

Now that there is such an increased demand for copper, prospecting for mines is going on more actively than ever. Many of the known deposits which have not of late been worked, owing to the price and low grade of the ore, are again being exploited. This is particularly true in Arizona. In the mountains about Tucson there are known to be many bodies of ore. A great advantage the prospector has nowadays over the man who went out a few years ago is the fact that he is better equipped for determining the value of what he finds.

AS TO the late boom in West Australian mining stocks the Sydney *Daily Telegraph* says: "We can promise London folk that shortly there will be exposures which will edify them. They will learn, for example, that a mine of which the present market value on the London Stock Exchange is over £160,000 has had two big crushings in succession which have returned 3 dwt. and 4 dwt. per ton, and that the information has been withheld from the shareholders, who have been led to believe that the battery has been idle pending additions and alterations."

SOME of the gravel miners along the streams in Siskiyou county, Cal., are becoming interested in a scoop or dredging apparatus lately invented for working gulch and creek bed claims, where the bedrock is deep. It is simply a scoop guided by a slanting cable, extending 100 feet or more in length, to bottom of diggings, 30 to 50 feet deep in an open cut. This method, it is claimed, does away with the use of derrick or pump, as the scoop will take up gravel and water to the extent of over a ton each load, and can be worked rapidly with one man at the engine and two more in the cut, doing the work of a dozen or more men under the old system.

ACCORDING to the report of the Princess Estate and Gold Mining Company, Limited, of Johannesburg, South Africa, during the last year they treated by the cyanide process 38,682 tons, 75 per cent of the tonnage crushed. During the first four months the percentage of gold extraction was only 60.46 per cent of the gold contents of the ore, vegetable matter having had a deleterious influence on the cyanide solutions. In the last eight months, when only clean sands were treated, the actual percentage of extraction rose to 71.8 per cent, and ultimately 75 per cent.

SHAFT SINKERS on the Amador Queen No. 1 at Jackson, Amador county, Cal., owned by the Jackson Exploration and Development Company, Limited, claim a record. The shaft is being sunk by contract, three eight-hour shifts of two men each being employed. Sam Harvey is the contractor and attends to the timbering, his partners being J. Kitto (who, in conjunction with Harvey, won the drilling contest championship in 1895), John Fox, Hart Roberts, Sam Harris, J. Staples and Joe Jefford. During the month of January, 1897, after being hampered by a sudden influx of water for two or three days, this crew of men sunk and timbered the shaft 85 feet. The shaft is 9x5 feet within timbers, 12x12 timbers being used, and is in granite.

IN the Aspen, Colorado, district the managers and owners of all the large properties have agreed to reduce the scale of royalties exacted from leasing miners in amount to correspond to reductions promised in freight by the railroad companies. The agreement as drafted states that the owners and leasers of mines in the vicinity of Aspen, realizing that the mines contain large bodies of low-grade silver ores, which cannot be mined and marketed at a profit under existing railroad transportation and royalty rates, and knowing that a reduction in these rates would greatly increase the output of ore and furnish employment to a large number of men and thus add to the general prosperity of the city and county, agree to the reduction proposed.

A PARTY of miners, who had left Circle City, on the Yukon, Alaska, Nov. 18th, arrived at Dyea, on the southeast Alaskan coast, Jan. 28th. They report that a number of new strikes have been made on the Yukon. Of course, those who will gain the most are the men who have gone in prepared to make a long stay and carry themselves over a season or two. The newcomers of this summer need not expect that they can take advantage of the discoveries made without money. Yet, from all reports, in spite of the many difficulties of climate, transportation and shortness of supplies, men of experience, with provisions and money to carry them over for from two to three seasons, will find more than the usual opportunities for making a stake. But more unheeded advice has been given and will be given about Alaska than many less remote and more accessible districts. The usual rush of inexperienced tenderfeet, without means of subsistence, will go north in a few months.

THE following subjects for consideration have been suggested to the British Columbia Legislature by the *Mining Record* of Victoria, B. C.: Liberal appropriations for roads and trails; better police protection; amendments to the law relating to mining incorporations for the better protection of investors and the checking of over-capitalization of companies; a re-arrangement of mining recorders' offices, so as to give prospectors and others the least amount of trouble in recording claims; amendments to the act relating to the incorporation of towns; a liberal policy towards railway extension and to aid new railways; a strict scrutiny of all applications for railway charters; a liberal appropriation for advertising the mineral resources of the province and the publication of much needed maps of mining districts; abolishing working miners' licenses; an act to compel all mining companies doing business in this province, and incorporated under the laws of the State of Washington or elsewhere, to re-incorporate under the laws of British Columbia.

THE Slocan, British Columbia, district, with an area of about 15 by 25 miles, according to W. A. Carlyle, the government geologist, produced in 1896 18,215 tons of ore, which yielded 2,141,088 ounces of silver, and 19,210,666 pounds of lead or an average of 117.4 ounces of silver per ton and 52.7 per cent lead, giving a net profit of $75 per ton. Many carloads of ore shipped yielded as high as 300 and 400 ounces of silver per ton. The Slocan Star, which has the largest chute of high-grade ore in the district, received from the smelters from 11,529 tons of ore and concentrates sold during the last three years 912,000 ounces of silver and 13,482,000 pounds of lead. The mines shipping during the past season in the three districts were: Slocan, 42; Nelson, 4; Ainsworth, 9. The miners at work were: Slocan, 1000; Ainsworth, 200; Nelson, 350. The ore shipped was: Slocan, 2,316,561 ounces of silver, 17,778,384 pounds of lead, value $2,085,445, against $942,094 in 1895; Nelson, 586,143 ounces of silver and 2,010,294 pounds of lead, value $493,225, against $38,120 in 1895; Ainsworth, 203,897 ounces of silver and 2,476,972 pounds of lead, value $210,918, against $384,677 in 1895.

W. F. KENDRICK of Colorado directs attention to a new feature in the smelting interests of Denver and Pueblo—the shipping of ore, carrying heavy in lead as well as gold and silver, from the mines of British Columbia in bond through the United States to the Gulf of Mexico and thence by British steamers to Liverpool, the ore being smelted at Denver and Pueblo while in bond during transit. The ore carries upward of 60 per cent in lead, on which account the lead trust, it is claimed, tried to freeze out the English owners of the great silver and lead mines of British Columbia by declining to buy the output of the mines. That district is so far from the European market that the freight rates were heavily against them, so much so that the lead contained in their ore was of little commercial value. As the ore enters the United States boundary, it comes under charge of United States custom officials, and in this way is transported to the smelting works, where it is placed in bond warehouses, smelted, refined, the lead bullion shipped by rail to Galveston, thence by steamer to Liverpool, from 100 to 200 tons per day being handled in that way. It is claimed that the amount of lead that can be produced from these British Columbia mines would overstock the market and cause heavy loss to the trust, and the mine owners of that district, to protect themselves, formed a strong syndicate, which has been able to make arrangements with the railroad reaching the Gulf on terms enabling them to market their lead in Liverpool, distant from their mines by the route taken equal to over one-third the circumference of the globe.

Outline of the Geology of California, with Reference to Its Mineral Deposits.

Written for the MINING AND SCIENTIFIC PRESS by HAROLD W. FAIRBANKS, Ph. D

The great mining interests of California make it important that a general knowledge of the principles of geology should be possessed by those interested in the development of the various branches of this industry. The application of the science to the needs of society is its utilitarian aspect, but there is another important one. Men are inquisitive and want to know, for the satisfaction of knowing and being intelligent, about the wonderful processes of nature by which they are always surrounded.

As a civilized people we should develop science not only for its practical results, but also for its ministration to the higher purely intellectual life of the race. The nature studies, among which geology is one of the most important, although often more neglected, are of the highest value in leading men away from the more sordid motives of existence to a nobler conception of life. The cosmic principles illustrated in geologic changes are at work around us continually and if we go through life with our eyes shut to them we miss not only many pleasurable experiences but are certainly less able to cope with nature and turn her to our advantage. We are fortunate in living in a region filled with the most attractive examples of geological and mineralogical processes, and in what is to follow I shall try to present these in a manner to arouse interest in the scientific as well as practical side.

In this series of articles I shall endeavor to give an outline of the remarkably interesting geology of California, as well as some of the general principles by which geologists are guided in their efforts to unravel the almost inconceivable complex history of our earth. If I can arouse any to take an interest in this most practical of all studies, as well as impart some information which shall be of value to the miners, the objects for which these articles have been prepared will have been accomplished.

The science of geology has reached a position at the present day which entitles it to the consideration of legislators in their efforts to encourage and build up means for developing the natural wealth of the State. The science is not a mere ornamental set of theories, but a body of knowledge built up at the cost of much time and labor, which may be made of the highest practical value.

We look out upon the mountains, valleys, and rivers flowing to the great Pacific ocean and it seems to us, judging from our brief experience, that we are in a world whose features are permanent and stable. The expression of the poet Bryant, "The hills rock-ribbed and ancient as the sun," seems to us not poetry but reality. However, when we come to study closely the processes of nature we begin to doubt the truth of this idea, "the everlasting hills," for we sometimes find shells on their summits similar to those living in the ocean, and the conclusion seems irresistible that they were once beneath the sea and that the sea must now cover in places what was formerly dry land. To the beginner who has not yet learned the methods of research into the past history of the earth, the forms of nature about him are utterly puzzling and meaningless. It has been the effort of the geologist to discover the sequence of events which have taken place, and the method of their action in shaping the world and bringing it to its present condition. He has attempted to discover the laws exemplified in all the processes and to reduce the complex phenomena about us to order. But what has he to go by? Man was not upon the earth during the millions of years which have passed in its history, and how is he able to speak with any certainty about these distant happenings?

The underlying principles are partly as follows: So far as human experience is concerned nature is observed to be uniform and the sequence of events invariable. Nothing happens haphazard or according to chance. We reach the uniformitarian view of the world, which means that the same causes have operated during its whole history which we see operating to-day. The same conditions have always produced the same results. Our lives are so short that we cannot possibly experience the mighty changes which we know have taken place, but by careful observation we have been enabled to find out that our earth is not stable; that the sea and land are oscillating now as we know they have in the past; that mountain ranges are being worn away by erosion as well as undergoing uplift or depression. In short, by means of a critical observation of what is going on to-day we are able to decipher the ancient records of the world engraved in the rocky strata. In studying the geological processes going on now we find various phenomena taking place before our eyes which have been fossilized, so to speak, in the rocks on which we tread. At many places along the seashore we see great beds of pebbles and boulders being sorted and arranged in layers by the action of the waves. In climbing over the mountains many miles from the ocean we come upon beds of pebbles called conglomerates, which have the same appearance as those along the seashore, and the conclusion is formed that the mountains were once beneath the sea, and that where the conglomerates occur there was an ancient shore-line.

Beds of sand are formed at the present day in more quiet waters out farther from the shore, or on it when boulders are absent. When we meet among the rocks similar sands hardened to sandstone or quartzite by ages of consolidation and metamorphism, we argue that in those spots in ancient times conditions existed like those where sands are sorted in beds at the present day.

Farther at sea, or in quiet, partially inclosed bays, fine silt brought down from the mountains or ground from the sea-cliffs is being deposited, and in the course of ages it will be hardened to form shale or slate, or metamorphosed to form mica schist.

By means of the animal remains which have been entombed in these beds we are enabled to say whether the ancient body of water was the open ocean, partly inclosed brackish lagoon, or fresh water lake.

The great beds of limestone and marble scattered over the earth are also very interesting. They often consist, in part at least, of corals and other animal remains. A large part of the material of some beds may have been precipitated chemically in the bed of the ocean, but we are satisfied that those full of corals were formed in a manner similar to the coral reefs in the shallower regions of the tropics.

We also know that when tropical plants and animals are discovered in the arctic regions, that climates have not remained the same indefinitely in any particular locality, but that portions of the world have been at one time much warmer than now, while during another, called the glacial epoch, arctic animals and plants descended into what are now the temperate regions.

Our studies make it certain that, by means of the different characters exhibited by the rocky strata exposed in all parts of the world, whether sandstone, shale or limestone, or their metamorphosed products quartzite, mica schist or marble, we can determine the conditions existing in any special region and the disturbances which that region has undergone.

But these are not the only rocks with which we come in contact. There are the granitic types of many kinds, the greenstones, the porphyries, and various volcanic rocks. These all give evidences of once having been molten. There is good reason for believing that the globe has cooled from a molten condition to the comparatively stable one in which it is now. It used to be thought that in granite we had the original fire-formed crust of the globe, but now it is known that such is not the case, for we have found that in California the granite of the Sierra Nevadas has been squeezed into the auriferous slates which are quite young, geologically speaking. The original crust of the earth has in all probability entirely disappeared, and there have been formed in its place the later eruptive rocks and the sedimentary ones resulting from their decomposition.

(*To be Continued.*)

California Deep Mining.

It is no longer a debatable question whether deep mining on the "Mother Lode" in this State will justify the expenditure, for work done for several companies has demonstrated that it will pay. The old Eureka, at Sutter creek, Amador county, was worked to the 2200 level on the incline, and paid its owners several million dollars in dividends. This mine has been shut down for many years. There can be no doubt it will be opened up again and produce many millions more before the 3000 level is reached. The Kennedy mine, at Jackson, Amador county, is down 2200 feet vertical. At that point the largest ore body ever discovered in that mine has been developed. At the present writing the extent in length or depth of this great ore body is not known, but it is known to be from 30 to 40 feet wide of high grade milling ore. No doubt ought to exist in the minds of practical mining men in California about this ore body going down to the 3000 foot level. At 3000 feet it may be larger and even richer than it is on the 2200 level. The Oneida Mining Company, Amador county, are sinking a vertical three-compartment shaft, and intend to go to 1700 feet before they cut the vein. The Argonaut Mining Company, of Amador county, sunk their shaft 1400 feet before cross-cutting the vein. The old Keystone mine, at Amador City, paid several million dollars in dividends, was supposed to have been worked as deep as it would pay, and therefore was practically abandoned many years ago. The main shaft was only 1300 feet deep on the incline, and at that time the mine was shut down. About seven years ago the owners commenced to sink to the 1500 level. They started ten of their forty stamps, and shortly after ten more were dropping, and finally all the stamps were dropping on paying ore. Two years ago the old mill was burned down. A new forty-stamp mill was built and in running order in ninety days. It would not be surprising to see 100 stamps dropping on Keystone ore within the next year. The fissure in the Keystone is from 500 to 1000 feet in width. The Gwin mine, in Calaveras county, which paid several million dollars in dividends, was idle for eighteen years. The present owners had the money and the confidence in deep mining on the Mother Lode to spend their money freely. They started a new vertical shaft to cut the vein 1400 feet deep. At that depth the old bullion producer did not disappoint its new owners, for a fine body of high grade ore, 14 to 20 feet wide was developed. A fine forty-stamp mill was built, and inside of two years from the day papers were signed the owners commenced to get returns.—E. C. Loftus in Herald of Trade and Finance.

Care of the Transit and Methods of Work.

Written for the MINING AND SCIENTIFIC PRESS by O. H. PACKER, M. E.

It will be impossible to treat this subject exhaustively in so limited a space. Only the principal points can be mentioned.

Care of the Transit.—When not in use the instrument should be placed in its box or in a large case made to contain it mounted. Whether in the box or case the needle should be allowed to seek the pole and then be raised off the pin to prevent dulling the point. This will also assist the needle in retaining its magnetism. When the instrument is in the field, but not in actual use, it should be covered with a silk or waterproof sack to shield it from the rays of the sun, thus preventing unequal expansion of the standards, etc.

Clearing the glass above the needle from dust by rubbing with the silk cover often magnetizes the glass, causing the needle to "stick." To discharge the glass touch it in several places with the moistened finger. Use special care not to disturb any adjusting screws by an accidental blow. It is easier to keep an instrument in adjustment than to adjust it. If the objective slide is not protected by a dust guard remove the dust before closing the slide. Looseness in this slide affects the line of collimation and makes the instrument useless for accurate work.

Adjustment of the Transit.—This subject would require too much space to be discussed here.

To Run a Straight Line.—Having the two points which determine the line to be run, set the transit over the forward point with one pair of levelling screws *parallel* with the line. Level carefully with one plate level *across* the line and the telescope approximately on the rear point. With the tangent screw bisect the rear point. Revolve the telescope on its horizontal axis and locate a point in advance (using a stake, tack and plumb line). Reverse the telescope and backsight to test the stability of the instrument. If O. K. unclamp the alidade and revolve it approximately 180°. Revolve the telescope. It will be approximately on the rear point. Relevel the *cross* bubble. With the upper tangent screw bisect the rear point. Revolve the telescope and locate a second point in advance beside the first one (possibly on the same stake). Backsight again for stability. The true line passes half way between these two points. By this method all instrumental errors are eliminated. Of course this method cannot be used unless the transit has a full vertical circle, as it should have.

To Measure a Horizontal Angle.—Center the transit over the vertex of the angle to be measured. Bring the telescope approximately on one of the points. Level carefully. Bisect the point by means of the tangent screw. If the instrument has two verniers record the reading of each. Unclamp the alidade and turn the telescope upon the second point. Clamp. Bisect by means of the *upper* tangent screw. Record both vernier readings. Correct the readings of vernier A by one-half the difference between the readings of A and B. The difference between the corrected readings should be recorded as "corrected reading No. 1." Now approximately bisect the angle with the telescope. Revolve the telescope on its horizontal axis. Unclamp the alidade and revolve it approximately 180°. Relevel. Now measure the angle again and correct the readings as before. Record as "corrected reading No. 2." Correct No. 1 by one-half the difference between No. 1 and No. 2. The result is the *true* angle. This method eliminates all errors of adjustment and eccentricity.

To Measure a Vertical Angle.—See that the vertical circle reads 0° when the instrument is leveled, the plate and telescope levels agreeing. Bisect the point. The reading of the vertical circle is the true angle if the instrument is perfectly made and adjusted. But these perfect conditions never exist. Therefore, proceed as follows: Level. Measure the angle and record the reading. Revolve the alidade 180°. Revolve the telescope. Level *again* and measure the angle again. Take the average of the two readings for the true angle. This method eliminates the errors of adjustment in the plate bubbles and of the vernier to the vertical circle. It is evident that this method requires a full vertical circle.

Traversing.—Traverse surveying is running a series of consecutive straight lines, the azimuths or bearings being determined with reference to due south, *i. e.*, the bearing of each line is the angle formed by the intersection of each respective line with the meridian.

The limb should be graduated from 0° to 360° in the direction moved by the hands of a watch. In

order to make a traverse survey the instrument must be "oriented" at each station, *i. e.*, so placed that the telescope would point due south when vernier A reads 0°.

There are two ways of orienting. A customary method, not the best, is to clamp the alidade and revolve telescope before moving from a station. Then set up on the next station, bisecting the rear point by means of the *lower* tangent screw. Reverse the telescope. The instrument is now oriented. Bisect the next forward point. Record the readings and proceed as before.

A better method is to set vernier A to read the back azimuth at each station. The back azimuth is obtained by adding (subtracting) 180° to (from) the last forward reading. The length of the lines run can be measured by any accurate method.

Therefore, to run a traverse proceed as follows: Set up over station No. 1 with the telescope due south, vernier A reading 0°. With the lower limb clamped turn the alidade so as to bring the telescope on station No. 2. Bisect the point by means of the *upper* tangent screw. Record the vernier readings. Turn the alidade *exactly* 180°. Clamp. Set up on station No. 2. Unclamp the *lower* limb and bring the telescope on station No. 1. Clamp and bisect the point by means of the *lower* tangent screw. Now loosen the alidade, locate and bisect station No. 3. Record the vernier readings. Turn the alidade *exactly* 180° and proceed as before. The azimuths are recorded from 0° to 360°. The *latitudes* and *departures* are computed by means of the following formulæ:

$$\text{Departure} = \sin \times \text{distance}.$$
$$\square\text{Latitude} = \text{cosine} \times \text{distance}.$$

The use of logarithms will *greatly* lessen the work. For facilitating the office work there are special tables of sines and cosines conveniently arranged for azimuths from 0° to 360° and for every degree or 30 seconds of arc.

Junction, Nevada, Feb. 3, '97.

The Coal Fields of Esmeralda County, Nev.

Written for the MINING AND SCIENTIFIC PRESS by M. A. KNAPP.

About twenty-five miles from the great silver mines of Candelaria, Nevada, and the same distance from the Carson & Colorado Railroad at Rhodes' Marsh, lies an extensive but undeveloped coal field, first discovered about three years ago. Had it been found before the Candelaria silver mills shut down, and while they were running full time with wood at $16 per cord, it would have made a fortune for the lucky prospector who had sense enough to investigate the peculiar black, shaly croppings over which many of them must have walked.

At present there is no demand for large amounts of fuel by any concern in that part of Nevada besides the Carson & Colorado Railroad; and as that company does not see business enough to warrant it in extending a spur to the mines (the management being in the wood business themselves), and as the coal at present developed could not compete in distant markets with a first-class coal, it is unlikely that any large amount will be mined for some years.

Except in case of a rise in the price of silver and a resuscitation of the different camps of Candelaria, there appears to be but one probable future demand for fuel in that section sufficient to cause the prospecting and development of these promising coal fields. About twenty miles to the south of them lies the old mining camp of Silver Peak. This would better have been Gold Peak, as it has been a producer of high-grade gold ore for years. This was largely gouged out of immense ledges of low-grade ore, which would not pay by the expensive methods of handling and milling in vogue there. There is little doubt that capital will eventually take hold of these properties on the large scale their great value justifies; and when it does so there will be a revival of gold mining in the outlying camps as well. This will make a market for a considerable amount of Columbus coal. As wood has become scarce and expensive at Silver Peak, the coal could be delivered in quantity in that town for $8 or $9 per ton.

In view of the probable growth and importance of this section in the near future, a description of this coal field may be of interest to miners on this coast, as well as to geologists, owing to its rather interesting stratigraphical relations.

The coal is found in the lowest strata of a Tertiary lake bed series, now exposed by displacement along a line of faulting, as explained later.

There are two workable veins of coal outcropping, besides numerous bands of coaly shale. One of the veins is 1½ feet thick; the other, lying 200 feet deeper, is 5 feet thick. The latter lies in the middle of a 50-foot belt of coaly shale; and as it is the lowest strata outcropping the conditions seem promising for better developments by prospecting the deeper formations. The shales enclosing the coal dip to the north and northeast at low angles, and extend to the northwest, north and northeast. They are probably to be found under the whole of Columbus marsh, northwesterly. To the north they must be cut off (possibly by a fault line) at the base of a range of hills four or five miles distant.

To the northeast and east they probably extend under most of the level and rolling land in that direction for ten to twenty-five miles from the coal mines. There is an area approximating eight by twenty-five miles under which these strata extend. How much of this contains coal, and within reasonsonable distance from the surface, is a matter of conjecture; but the fact that in a well bored at Columbus, twelve miles from the mines, some years ago, some small seams of coal were found would lead one to believe that the extent of the coal land is considerable.

The development work done up to this date upon the coal veins is largely wasted energy, and consists of several inclines and shafts in the contorted portion of the field near the fault line. The work has been carried to a depth sufficient to show the character of the unaltered coal in this section of the veins.

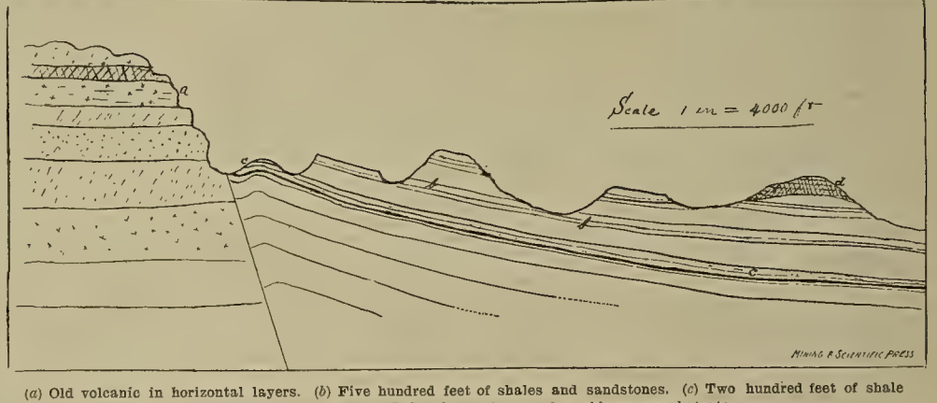
The material furnished by the two veins mentioned is almost identical in composition, and is a compact, glossy, black, bituminous coal of a coking character, giving a firm, hard coke. The average analysis is as follows:

Fixed carbon	38½%
Volatile matter (including moisture)	31½%
Ash	30 %

The excessively high percentage of ash does not interfere with its free burning properties when properly handled, and it does not clinker on the grate. The coal cokes somewhat when burnt, but a little judicious stirring on an open grate overcomes this difficulty. A test of ten tons that was made by the Central Pacific at Reno on a locomotive gave very favorable results in every respect except the annoyance of several stoppages to clean the ash box. No clinker occurred, as there is almost no sulphur in the coal. It burnt freely with a long, hot flame, and, when fed evenly and the coke kept loosened on the grate, gave excellent returns.

As the high ash percentage is due to foreign matter—clay and sand, washed into the beds while the coal was being deposited—it seems probable that, if the field is extensive, good, clean coal can be found in some part of it. Any large demand for fuel in this section would justify extensive prospecting of the strata by deep boring. With only 10 per cent of ash this coal would have about 50 per cent of fixed carbon and 40 per cent of volatile matter, which, with its other qualities, would make it most excellent fuel.

The geological features of the deposit are interesting as well as important in judging the probable extent of the coal field. The accompanying sketch shown a cross section of the strata northeast from the coal outcrop:



(*a*) Old volcanic in horizontal layers. (*b*) Five hundred feet of shales and sandstones. (*c*) Two hundred feet of shale containing bands of coal. (*d*) Conglomerate unconformable upon coal strata.

The mountains formed by the volcanic strata (*a*) are the result of orthographic displacement along the fault line, in accordance with the "Great Basin" system of faulting fully described in a monograph of the United States Geographical Survey, 1885, by J. C. Russell, on the quaternary Lake Lahontan. The throw of this fault is at least 3000 feet, the steep escarpment of the many-colored volcanic cliffs being still 2000 feet above the coal strata. The fault line runs along the base of the range about north 70° east, dipping here about 75°. It shows at the coal mines as a 30-foot belt of clay gouge between the volcanic rocks and the shales. A half mile west are two low hills of hot spring deposit (aragonite), and about two miles farther are still existing hot springs—a proof of fault lines in this country, according to Russell, as well as strong evidence of some slight recent displacement.

The coal-bearing strata of shales and sandstones of every shade of pale yellow and drab are contorted and broken near the fault line, and dip here about 15° to northeast. Two miles away they are nearly flat to 5° of dip. On top of these strata is seen in places a coarse conglomerate wash of boulders of volcanic rocks, which is quite unconformable with the coal strata. The deposits of the Quaternary lake which filled Columbus marsh also overlie these Tertiary strata, and possibly to a great depth.

In the lowest coal strata there shows at one place a porphyritic volcanic rock, and a half mile west is a small body of basalt. As there has been considerable volcanic activity in this section since the displacement on the fault line took place, it seems more probable that these rocks are intrusive than that they are the underlying bed on which the coal was deposited.

Professor Walcott, director of the United States Geological Survey, recently took a flying trip to the Silver Peak mining district. He made a hasty examination of the coal field and stated that the coal strata corresponded to the Laramie series of Wyoming, in which extensive coal deposits are found, and which is a connecting link between the Cretaceous and Tertiary periods. Professor Merriam of Berkeley, however, determined as Tertiary, and probably Miocene, some fossil fresh water shells collected by the writer in the shales 50 feet above the coal measures. This would make the coal about the same age as the Coos Bay deposits; but, whatever the geological age, the quality of this coal will certainly be excellent if found free from ash in these strata.

It is to be regretted that this extensive deposit of fine fuel was not found and developed when it would have been of such great value in cheapening the cost of running the Candelaria mines and mills, and enabling those famous mines to continue to produce the white metal in spite of the action of Indian mints and international conferences.

Deep Shafts.

The following is a list of leading deep mining shafts in the world, as published in the London *Mining Journal:*

UNITED STATES.	*Feet.*
Red Jacket, Calumet and Hecla, Lake Superior	4900
Tamarack, Lake Superior	4450
Yellow Jacket, Comstock, Nevada	3123
California Mine, Colorado	2260
Grass Valley, Idaho	2182
Kennedy Mine, Jackson, California	2200
Pottsville shaft (disused), Philadelphia and Reading Coal and Iron Company	2000
BELGIUM.	
Produits Colliery, Mons	3937
Viviers shaft, Gilly	3750
Viernoy shaft, Anderlues	3300
Marchienne Colliery	3117
St. Andre shaft, Poirier Colliery, Charlerot	3100
Ciply Colliery, Mons	2950
Houssu Colliery, Centre	2300
Marihaye Colliery, Liege	2100
Average depth of all Belgian collieries	1420
GREAT BRITAIN.	
Pendleton, Manchester (workings)	3474
Ashton Moss, Manchester (workings)	3360
Astley Pit, Dukinfield (workings)	3150
Dolcoath Mine, Cornwall	2582
Rose Bridge Colliery, Wigan	2446
Cook's Kitchen, Cornwall	2436
Harris' Navigation, Pontypridd	2367
Cadeby Main Colliery	2250
Bickershaw Colliery, Leigh	2210
Moss Collieries (No. 4 pit), Wigan	2205
Astley Pit, Dukinfield (shaft)	2058
Niddrie, Portobello, N. B.	2010
Wearmouth Colliery	1722
Loanhead Colliery, Shott's Iron Company	1700
AUSTRIA-HUNGARY.	
Adalbert, Przibram, Bohemia	3672
Maria, Przibram	3281
Anna, Przibram	3100
Franz Josef, Przibram	2900
Procopi, Przibram	2900
Einigkeit, Joachimsthal, Bohemia	1750
Amalia, Schemnitz, Hungary	1750
VICTORIA.	
Lansell's, Bendigo	3302
Lazarus, Bendigo	3024
Magdala, Stawell	2400
Twenty-five gold mines exceed	2000
GERMANY.	
Kaiser Wilhelm II, Clausthal, Harz	2960
Einigkeit, Lugau, Saxony	2620
Samson, San Andreasberg, Harz	2560
Freiden Colliery, Olsnitz, Saxony	2515
Concordia Colliery, Olsnitz, Saxony	2420
Hansa Colliery, Huckarde, Westphalia	2330
Maria Colliery, Hongen, Westphalia	2300
Camphausen Colliery, Saarbrucken	2296
Freiberg, Saxony (maximum depth)	2060
FRANCE.	
Montchanin Colliery, Le Creuzot	2300
Treuil Colliery, Saint Etienne	2034
Hottinguer shaft, Epinac	2000
Ronchamp Colliery, Haute-Saone	1870
SOUTH AFRICA.	
Robinson Deep, S. A. R.	1991
Nourse Deep	1578
Crown Deep	1321
Langlaagte Deep	1302
Jumpers Deep	1260
Kimberley Mine, Cape Colony	1261
De Beers Mine	1097
NORWAY.	
Konigsberg Silver Mine	1000

Mining Summary.

CALIFORNIA.

Amador.

Dispatch: On the McMahen mine the shaft is down 100 feet and a crosscut is being run from that level to determine the dip of the ledge and the location of the permanent works.

Republican: From the first cleanup at the Argonaut the rock averaged between $11 and $12 a ton, nearly $10 of which was in free gold.

A recent assay of 40 feet of the 85-foot ledge of the Bellwether mine gave a result of from $7 to $18 a ton.

The diamond drill has been started at the Alma mine at the 1000-foot level, and the ledge has been struck 105 feet from the shaft.

Butte.

Mercury: At Cherokee, T. L. Vinton is working a crew of forty men on a portion of the old Spring Valley mining claim under a permit from the Debris Commission. The ground, which is very hard, is broken up by powder blasts, tunnels being run in on the bedrock to a length of 65 feet and the powder exploded in these tunnels. About 2500 pounds of powder is used in each blast. Three of these shots are exploded simultaneously, 65 feet apart and 65 feet from the face, and break up the ground for an area of 80x200 feet. The settling reservoir is located eleven miles below Cherokee on Dry creek and is kept in good repair, three men and a team being kept constantly at work. After leaving this dam the water is carried in the Cherokee canal and dumped into the tules where it can do no harm.

Register: Welsh, Sweetzer & Co. will begin opening a gravel mine on the land of P. R. Welsh in the lava bed country south of Oroville. This land was mined by the Chinese years ago, but on account of lack of powerful machinery they could not get down where the richest gravel lies.

Josiah Champion has his tunnel at the Oregon mine in 500 feet. This promises to be one of the greatest enterprises in Butte county. The ledge is from 13 to 14 feet wide in the upper tunnel. The rock is decomposed, handy to get at and there is no water to bother the men. Mr. Champion intends to put up a 25-stamp mill when he strikes the ledge.

Calaveras.

Mountain Echo: Bisbee & Rasmussen have struck a very rich body of ore that carries a large per cent of sulphurets. The ledge is about 40 feet wide.

Citizen: The Sugar Pine mine, on San Domingo ridge, has been bonded to McClay & Tretheway for $6000, $500 of which was paid down. The mine was recently discovered and is owned by Briseno & McDonald. A shaft 45 feet deep was sunk, exposing a 2-foot vein of rich ore.

Chronicle: At the Thorpe mine the working shaft, which is sunk off of the vein, has reached a depth of 600 feet. The vein was crosscutted at the 500-foot mark and the work of running the 600 level is now in progress with the prospect of finishing about the middle of next week, when sinking will again be resumed. The aim is to go down 700 feet, then open up the three levels and begin stoping. Fifteen men are at present on the pay-roll. The vein in the 500 foot level runs from ten to fifteen feet in width through in some places it is as wide as twenty feet. The rock in some parts of this will assay $12 to the ton. though taken on an average it shows a yield of about $7.

A new hoist is to be erected on the Bund mine and also one on the Burgess mine on the Rathgeb property. These mines are being operated by the California Exploration Company.

Work at the Emerson mine has been suspended temporarily. An increased flow of water was encountered and in order to handle the same additional machinery is to be erected.

A twenty day's run at the Infernal gravel mine in Chili Gulch, owned by Anthony & Cope, yielded $1,2 0. There are only six men employed and only development work is being prosecuted.

El Dorado.

(Special Correspondence).—Gravel mining is receiving attention in the neighborhood of Shingle Springs on rather a large scale.

Berry & Goff of Oakland are developing property in Quartz canyon, in the Georgetown section. They claim a ledge of low-grade ore 24 feet in width.

Work is progressing steadily on the projected electric power plant three miles from town on the American river. The property was bonded by Frank H. Page from Pearson Brothers for a New York company.

At the Eagle King mine, near Grizzly Flats, Melton & Witmer owners, a 4-foot ledge of high-grade ore was opened last week at a depth of 265 feet.

Mulkey & Spreckels have let a contract for 200 feet of tunnel in their gravel property near Fair Play. From a comparatively small open cut Mr. Mulkey took out $1032 last week. There are over 400 acres in the claim. It will be operated on an extensive scale.

John Kohlert has leased to four Oakland parties a stretch of country in which they are working old tailings. They are averaging $3 a day to the man. The property is located at Indian Diggings.

Estee & Dennar have bonded their gravel claim at Indian Diggings to Joseph Rodinea. A tunnel has been run 200 feet in good pay ground.

Mr. Sears of Stockton has bonded 180 acres from Mrs. M. French, four miles east of Indian Diggings. He has obtained a permit to hydraulic and will soon begin operations.

Seissenop & Hanley are doing well on their gravel claim just south of the Dalmatia mine, near Kelsey. In one day last week they took out $80, and on another day took out one piece that weighed $50.

The Chanced Upon quartz mine and 10-stamp mill in Kelsey were sold last week by P. G. Galpin and Mrs. M. Whitney of Oakland to Juan de Alvarado of London. Consideration $40,000.

The prospector in the employ of English and Scotch capitalists, the expert representing Eastern capital, and the mining man representing his own interests, are abroad over the county as was never recorded in the previous history of quartz mining in El Dorado. "Prospects" are receiving constant attention. Bonds are offered at very reasonable figures and on long time. El Dorado county has not presented so bright an outlook for quartz mining in thirty-five years.

The Grand Victory struck a new and rich ore body last week at the 300 mark of the shaft.

Placerville, Feb. 8th, '97.

The Darling mine, in El Dorado county, has been sold by Philip G. Galpin and Mrs. Mary F. Whitney of Oakland to Juan D. Alvarado of London for $40,000. The Darling has been idle for some time. Some ten years ago the late Senator Whitney and Mr. Galpin put up a 10-stamp mill and a steam hoist on the property.

Gazette: The Gold Bug Co have commenced building their new 8-foot flume in Canyon creek, and expect soon to be ready to take out gold.

Nugget: Tong and Ross of Clarksville are sinking a shaft on the Enterprise quartz mine in Marble Valley district. They have a 20-inch ledge.

At the Zentgraf mine the shaft is now down over 500 feet, or about 200 feet below the old tunnel. Sixty men are employed.

Gazette: At the Gentle Annie mine their 10-stamp mill is kept steadily at work crushing high-grade ore taken from the 300-foot level.

At the Grand Victory they are crosscutting from the bottom of their 300-foot shaft. In this crosscut they have encountered better and higher grade ore.

There has been a contract let at the Selby mine, Diamond Springs district, to sink the shaft 200 feet deeper.

The owners of the Griffith Consolidated mine, Diamond Springs district, are now sinking their main double-compartment shaft below the 150-foot level. It is their intention to sink to a depth of 600 feet before stoping.

At the Starlight mine, Logtown district, near El Dorado, the 10-stamp mill is running night and day on high-grade ore that is being stoped from the 200, 300 and 400-foot levels.

The Big Canyon is running steadily along furnishing ore to keep their 30-stamp mill and their chlorination plant at work all the time.

At the Larkin mine, Diamond Springs district, they are driving a crosscut from the 100-foot level east running for the ledge.

Inyo.

Register: J. W. Kelly has taken a force of men to commence development work on two groups of copper claims near Saline Valley. The first group, consists of the Copper Wedge, Tip Top, Copper Star, Copper King, Copper Queen and Clipper. The other mines include; Golden Eagle, Bismark, Bryan, Excelsior, Fairview, Standard, Butte and Summit. Assays from the Copper King, Star, and Tip Top show respectively 8 to 90 per cent, and 26 per cent commercial copper. All of these claims carry more or less silver with thousands of tons of ore in sight.

Kern.

J. R. Ellis of Frazier Valley, has sold his interest in the Rademacher to the Downing Mining Company of Visalia. They are working twelve men, running a crosscut, and have cut through 20 feet of good ore. They will sink a couple of shafts. The proposition of sinking for water is very encouraging. They are down 112 feet. So far water has not been struck, but the ground is very damp.

J. W. McNitt is milling thirty tons of rock at the Visalia Company's mill at Garlock.

Nevada.

Transcript: Preparations are being made to resume work at the old Blue Tent gravel mine, six miles north of this city. A restraining dam has been built, and recently a permit to hydraulic was granted by the Debris Commissioners. In former years a large amount of gold was taken from this mine. Experiments showed it would not pay to work by drifting. It is expected that everything will be in readiness soon to turn on the water.

Telegraph: Recently the W. Y. O. D. Company concluded to develop the easterly vein, and started a new shaft on the northerly extremity of the Parr claim. The shaft is now down over 300 feet in depth and an adit level run north about 100 feet to connect with a tunnel started from the surface for draining the mine. In addition to the work a tunnel has been run from the south side, 475 feet in length. The development on the back vein is very encouraging. A large vein of good ore has been encountered.

Placer.

Sentinel: The Central Mining Company at Deadwood has completed the new tunnel and will soon be operating through it.

P. A. Wagner, of San Francisco, has a bond on the property of the Sailor Consolidated Mining Company, comprising the Sailor, Sally, Alma and Hazel, through which the Canada Hill channel runs. Mr. Wagner secured the bond for a German syndicate.

The Glen Consolidated gravel mine, near Bald mountain, is paying well. The gravel pays from $4.50 to $5 per car. The gold is very coarse, and pieces of $5 and over are picked up in the breast.

Plumas.

National-Bulletin: C. D. Hazard has resumed work on the Plumas Imperial. Last fall the mine, ditches, dams, etc., were placed in readiness for a season of active work this year. The supply of water, owing to the late storm, is excellent. The Plumas Imperial is one of the most important hydraulic mining propositions in Plumas, possessing a large deposit of gravel, a fine water privilege and a large restraining dam and settling reservoir.

The pump at Thistle Shaft has been started. This was done merely to determine whether the water could be perceptibly lowered or not. That it could was demonstrated, but it is questionable whether the works could be emptied of the great accumulation of water at this season of the year. At any rate, work has been suspended, and it is understood that no effort will be made to resume till next spring. Whether the company will again attempt to work the rich mine through the shaft, or tap it by means of a long tunnel, is not known.

Shasta.

Searchlight: At Iron Mountain, where the ore is furnished for the smelter of the Mountain Copper Company, a rich strike was recently reported in the rock chute on the right, the ore showing a heavy deposit of native copper. About 300 men are now at work, which, taken with the 600 employed at Keswick, makes a total of 900 in the company's employ. About 500 tons of the ore are shipped daily.

Free Press: At the National Mill and Mining Company's property, in Churntown district, there are 34 men employed in the mill and mine. The former is running steadily on good ore and the latter is being developed as fast as possible.

The Hidden Treasure mine, on Slick Rock creek, together with the mill and water right, the property of the McCormick-Saeltzer Company, has been sold to the Iron Mountain Investment Company.

Sierra.

Mountain Messenger: Development work is being prosecuted in Slug Canon by Isaac Copeland, twenty men being now employed. The tunnel lately started to tap the old works in the Van Clief ledge had to be abandoned temporarily, on account of the heavy flow of water which was coming through the broken ground.

The 5-stamp mill which was lately constructed near Loganville by Mr. Copeland is running day and night on ore from the Bolivia.

Siskiyou.

News: The Klamath Flume and Mining Company will operate extensively in Happy Camp district. Their property consists of 1000 acres of rich placer ground.

At the McKinley mine they have 100 tons of high-grade ore, which will be hauled to the mill as soon as the snow gets off.

Parties are negotiating for B. G. Reeder's Bonanza mine in Fool's Paradise district. This mine has been worked only at a depth of 50 feet and a distance of some 300 feet in length, but about $12,000 were taken out by hand mortaring. Two hundred tons of ore left on the dump is supposed to go about $15 per ton. A stamp mill will probably be erected next summer.

Journal: George Warder is now crushing quartz from the Crowley ledge near Callahans, in a small stamp mill, with good results.

J. Fore has a force at work in placer mining at Callahans.

Work is progressing gradually on the Del Monte quartz mine at Humbug, owned by the Hearst estate. Good prospects were found in this ledge when first prospected.

Tuolumne.

Independent: Chicago men are about to purchase the Stanley mine, at Jacksonville.

The Black Oak mine is not sold, the parties bonding it having failed to make final payment.

The Gold Bug, a parallel east of the Draper, at Soulsbyville, has been opened by T. Whitto and a 2-foot vein discovered, giving a value of $100 to $150 in free gold. This vein is also a west parallel to the Black Oak.

Union-Democrat: At the Mammoth mine ten stamps are running night and day and new men are being put on as fast as there is room for them. It is reported that they have struck $40 rock on the 700-foot level.

Last week a 5-foot vein of very rich ore was uncovered in the Norwegian mine, near Robinson's Ferry. The mine was recently purchased from the Lawson's, whom it had made independently rich.

NEVADA.

Enterprise: Chinese and white men are working the Pro Bono Publico placer ground at the mouth of Six Mile canyon, raising gravel to the surface through shallow shafts sunk in the gravel at several points. So far no bedrock has been found and is not likely to be at the depth that can be sunk by windlass power, as a shaft sent down 113 feet at the placer where they are now operating, eighteen years ago, failed to reach bedrock. The entire plain east of town for a distance of five miles east of the mouth of Six Mile canyon, is a gravel bed of unknown depth, the bedrock not cropping out at any point on the plain.

White Pine *News*: At Cherry Creek V. G. Shepard has leased and bonded one of his mines in Granite district to Colorado parties, who commence operations at once.

Arrangements have been made by the Ben Hur Co. to ship boiler and other machinery for a 10-stamp mill, to be delivered on their mines.

Contracts have been made by the North Mountain Company for a boiler and other machinery.

OREGON.

Baker *Democrat*: Supt. Albert Geiser has come in from the Bonanza, bringing the output for the month of January, the amount being $10,000. The new engine and boiler, the former being 300 horse power and the latter double that capacity, together with ten additional stamps and other new machinery recently put in, are running well, and increased outputs may be looked for. The Bonanza will have forty stamps dropping by May 1st.

The incorporation has been affected of the Virginia Consolidated Mining Company under the laws of Nevada. The Con. Virginia mine is properly the south extension of the Virtue.

With continued depth the Virtue mine is richer than ever. So rich is the ore body and exhaustive at a depth of 700 feet that Mr. Grayson, the owner, is now contemplating the addition of twenty more stamps. This will run the monthly output considerably above the $30,000 mark, which has been credited to the Virtue for many months past.

Godfrey & Tabor, owners of the Red Boy mine, in Granite district, has shipped $4000 worth of gold bullion to the mint. The Red Boy has been a steady producer for the past two years, and to increase the output the owners propose the immediate enlargement of the mill.

The machinery from the Risdon Iron Works, San Francisco, for the French Flagstaff Mining Company, is arriving in Baker City.

Gold Hill *News*: Wm. Arthurs has purchased the W. A. Jones property on little Applegate, and will put a hydraulic plant on it.

Jacksonville *Democratic-Times*: Water is more plentiful than it has been, and the miners feel encouraged.

The Black Channel Company of Foots Creek district is building a number of ditches, flumes and reservoirs and will operate on a large scale.

The old Gold Hill mine, which produced a large quantity of gold in early days, is being developed by a crosscut aimed to strike the ledge at a depth of 250 feet.

It is reported that Ed Canfield of Galice Creek district has found the ledge for which he has been looking for a number of years.

WASHINGTON.

The Ivanhoe mine in the Okanogan country is about to commence shipping ore. They are now working on the 300-foot level and every shot shows free silver in the ore. There is now 1500 to 2000 tons of ore on the dump, the greater part of which could be shipped if Okanogan was blessed with railroad facilities. As it is, freight and treatment charges are $25 a ton.

It is reported that high-grade ore has been encountered in the Palmer Mountain tunnel.

Prof. Langhammer, who put the cyanide plant on the Wyandotte group, is now in Chicago forming a company to develop the Allison group, upon which he has a bond.

At Boundary the Legal Tender Mining Company is getting ready to commence active development work on its property, which consists of a group of six claims on Copper mountain.

At Kettle Falls Mr. Wise of Rossland has bonded the Rightside and has employed a number of men to develop it.

BRITISH COLUMBIA.

Review: At the Payne mine during December a total of 867 tons were shipped, while last month the product reached 1000 tons, even. This will net at the smelter about $100 per ton, and it is therefore safe to say that the mine has paid over $150,000 in sixty days.

The Silver Bell property, on the south fork of Kaslo creek, has been bonded by a syndicate represented by Frank Loring for $75,000, 10 per cent down.

There has been a strike of considerable importance recently made on the crosscut from the big tunnel of the Iron Mask. This was on the 210-foot level. The grade of ore is about $45 a ton. The clean ore body is about 15 inches wide.

Spokane *Chronicle*: The Skyline people at Ainsworth netted $26,000 from that mine in 1896.

The Salmon river country, in the Nelson district, is beginning to attract a great deal of attention. At present there are twenty mines working, despite the fact that there is considerable snow on the hills.

The Argo, a claim adjoining the townsite of Sandon, has been bonded for $25,000 to an English syndicate.

R. C. Campbell Johnston has purchased the Exchange group in the Slocan, consisting of four claims, for $31,000.

Negotiations are pending for the purchase for about $500,000 by the Vancouver and British Columbia Exploration Company of the Slocan Mining and Milling Company's properties, the Alamo, Cumberland, Idaho, Wild Goose, Corinth, Mocking Bird, Daybreak, Defender and Comet, situated in Alamo basin and on the divide between the south fork of Carpenter creek and Slocan lake.

The Bannockburn, Evergreen, Silver Bottom, Silver Reef, Iron Mask and Buckeye have been bonded to Ed N. Murphy for $50,000.

UTAH.

Salt Lake *Tribune*: The present output of the Bullion-Beck, which has already paid $1,967,000 in dividends, is reported at 300 tons a day. On the 800-foot level there is more ore blocked out now than can be marketed in a year, while that the chute is continuous from the 650 to the 900-foot level has been demonstrated.

At Mercur the property of the Gold King Mining Company has been bonded by James Haggin and his Eastern connections, and its systematic development will commence at once.

The report of the treasurer at yesterday's meeting of the Centennial-Eureka disclosed that during the past year ores have been produced of the value of $450,740.30, and that the dividends reached a total of $450,000.

At Mammoth the Swansea Tunnel Co. is being organized with a capital stock of $500,000. It is the intention to drive a tunnel into the mountain for a distance of 1000 feet, from which point a shaft will be sunk.

At Park City the great Ontario drain tun-

nel is within less than 100 feet of Daly No. 1. It is thought that with the completion of this great sub-waterway the old Daly, which has yielded its owners $2,887,500, besides a surplus of nearly $500,000 in the treasury, will take a new lease of life. Ore bodies that cannot now be reached on account of water will be worked.

Bingham *Bulletin*: In the 300-foot level of the Winnamuck, after running about 250 feet east from the main incline, ore has been broken into and it is coming in across the entire face of the drift. The winze sinking from the tunnel level is now 500 feet below the 200 and in solid ore, largely of shipping grade.

Mercur *Mercury*: On the 830-foot level of the Sunshine it is reported that a body of ore is being developed, running from $8 to $12 per ton.

A fine strike is reported in the Overland during the week, consisting of a 12-foot body of ore of good value.

The Herschel tunnel is now in 1340 feet and is being run with three shifts. The workings are in porphyry.

Tintic *Miner*: The Sioux-Ajax tunnel is now in 1700 feet.

Shipments from the district for the week are as follows: From the Bullion-Beck mine, 30 carloads ore; Centennial-Eureka, 10 carloads ore; Eureka Hill mill, 4 carloads concentrates; Ajax, 11 carloads ore; Mammoth mine, 7 carloads ore; Mammoth mill, 7 carloads concentrates; Carisa, 4 carloads ore; Sioux, 5 carloads ore; South Swansea, 5 carloads ore; Dragon iron mine, 1 carload ore daily.

IDAHO.

At Pierce the placer miners are feeling cheerful over the outlook for plenty of water for the coming season. Parties coming out from the mountains report the snow between three and four feet deep and still piling up. The interest that is being displayed in placer mining already indicates that this feature of mining will be pushed with vigor this year, and will result in the development of some large claims.

On Salmon river McFadden and Cooper have discovered a ledge of free-milling quartz nearly 40 feet wide.

MONTANA.

During '95 and '96 the Anaconda Copper Mining Co. shipped from Anaconda:

	1896.	1895.
Copper, lbs. fine....	125,350,693	99,775,294
Silver, ozs. fine.....	5,433,826.747	5,470,860 820
Gold, ozs. fine.....	17 411.3334	20,229.4498

In '96 the Boston & Montana Co. yielded about 60,000,000 pounds of copper.

Butte *Miner*: The Boston and Montana Company is increasing the ore reserves in sight. In addition to sinking 500 feet in two shafts, crosscutting and exploration work is being done in the other producing properties. Including over $300,000 construction charged to expense account, the Boston and Montana earned last year fully $19 per share on its capital stock.

The mill at the Hope mine in Basin, with a capacity of 250 tons of ore daily, will start up to-day.

White Cloud gold mine, five miles east of Florence, Ravalli county, was bonded by W. C. Tonkin of Thompson Falls for $18,000, $5,000 payable July 1, the remaining $13,000 Dec. 1. Tonkin also agrees to pay a royalty of 20 per cent on all ores extracted from the mine.

A rich strike of copper and silver ore has been made in the Receiver mine at the head of Horse canyon. At a depth of 220 feet a vein of copper ore was cut through in the shaft which goes 10 per cent copper and 22 ounces in silver to the ton.

Inter-Mountain: Word comes from Phillipsburg that the Combination Company will close down; that more than one-half of the miners have already been laid off and that the mill will finish the ore now in the bins in a week or so.

Helena *Independent*: The Merrell property has been purchased by C. McLure of the Granite Mountain and it is expected that operations will be resumed in the spring.

Mr. Essler has started up the Rimini concentrator to treat the Eureka dump. The mine is being worked by a small force and the ore is being shipped.

SOUTH DAKOTA.

Black Hills *Times*: The Horseshoe Mining Company's mines are now producing more ore daily than the Kildonan mill can handle, the capacity of which is now being doubled. When this is done it will be the largest chlorination mill in the world, and will handle from 200 to 250 tons of ore per day.

The Columbus Mining Company are advancing the drift from the 200-foot level of their main shaft to a connection with the old workings. It is now in over 400 feet. The ore body is evidently an extension of the Homestake.

The deal for the Carroll group of claims has been closed, deeds signed and first payment made, D. C. Boley and associates being the purchasers. The group consists of twelve locations situated on the Blacktail divide.

The Gold Queen Mining Company have resumed development work on their group of twelve claims, situated on Deadwood gulch, above Golden Gate.

Additional mining claims aggregating about 300 acres, situated in the vicinity of Garden City, have recently been included in the ninety-day option secured on other properties by C. L. Boon of Chicago. In the deal are now included the Kicking Horse, the Penobscot, the American Express, the Dalton and the Faust groups, also the property formerly owned by the South Dakota Mining Company, known as the Eva and Edna lodes, aggregating about 600 acres in all.

On the Union Hill Mining Company's properties the alterations of the old Richmond silver mill into a gold stamp mill are about completed, and it is expected that twenty of the sixty stamps will be dropping in a week or ten days. The mill will be equipped with four varieties of concentrators to test their capabilities and capacities. The contract for the new 200-stamp mill will be awarded about February 15th, the delay being caused by a change of the plans

The owners of the Hazel group of mines, adjoining the Golden Slipper property, are about closing a deal with Eastern parties, who agree to expend $10,000 in development work in consideration of a half interest in the property.

MICHIGAN.

The Calumet & Hecla Mining Co. in '96 yielded a total of 90,000,000 pounds of refined copper, the largest in its history.

The Atlantic Mining Co. hoisted 371,128 tons of rock in '96, which yielded 4,894,228 pounds of refined copper.

COLORADO.

CRIPPLE CREEK.

(Special Correspondence).—The New Ninety-six, on Gold Hill, belonging to the Mound City and Gold Hill Gold Mining Company of St. Louis, is being opened by the sinking of a shaft, drifting and crosscutting.

The Jack G., on Raven Hill, is under lease to J. R. Buchanan, whose shipments to the Victor sampler show ore values of $70 per ton.

The Marionet, on Gold Hill, shipped thirteen tons of ore one day last week which ran $25 per ton.

The Anaconda tunnel is in 4350 feet. At the breast an upraise of 500 feet will be put in to connect with the Kittie M. property (one of the Anaconda group). Shipments have been made continually from the Anaconda, but such shipments have been merely incidental to the work of development. A good deal of stoping has been done, and in the course of developments many veins have been cut, though comparatively little drifting has been done.

The Ingham mine, on Raven Hill, under the management of Supt. Lawton, has recently made building improvements and is doing some systematic development.

The Elkton, one of the best known mines on Raven Hill, has a 400-foot shaft and levels at each 100 feet. The first level runs 1100 feet north; the second 900 feet north and 125 feet south; the third 800 feet north and 280 feet south; the fourth 100 feet each way. Two station pumps, each 700 gallons per minute, serve to relieve the mine of surplus water. Ore shipments are now being made from the first and second levels and ore will soon be shipped from the third. No stoping has yet been done on the third and fourth levels. The Elkton now works about ninety men and three air drills are in use.

The Moose, located farther up the gulch from the Elkton, has been closed down for several weeks, though there is a rumor of soon starting up. This property has been a heavy producer, and, under favorable conditions, it will doubtless resume its former standing. The Moose shaft is down 680 feet and has twelve levels.

The Trail is a new property, which is being opened on the Elkton side of Bull Hill by Christopher and Lauterman. A new plant of machinery, consisting of hoisting apparatus, air compressor and five air drills, has been put in. A tunnel is being run in on the vein. Two shafts are being sunk, and from various points levels will be run.

The Last Dollar, in the course of its extensive developments, has been shipping ore in sufficient amount to pay the expenses of operating. The main shaft is down 375 feet, and ore is being shipped from the first level. December shipments amounted to seventeen carloads, of which 200 tons was high grade and 400 tons low grade.

The Orpha May, one of the big properties of Bull Hill, recently put in new machinery. The mine is shipping about twenty-four cars of smelting ore per month. At least, it has kept up this record for four or five months. As the facilities are now greater with the new machinery, its output is expected to be increased. The shaft is down 450 feet. About 100 men are employed here.

The Grouse, farther up the hill from the Orpha May, is busily sinking a shaft, which is down about 240 feet. Two levels have been run. This property has shipped ore for over a year.

The Theressa, on the south slope of Bull Hill, has put in a new plant of machinery—a 120-horse power boiler and two air compressors. The January shipments amounted to about 200 tons.

The Legal Tender, owned by the Golden Circle Mining Co., is a Bull cliff property. It has shipped 1000 tons of ore worth about $100,000.

The Christmas mine, near the Legal Tender, shipped 150 tons of ore in January. The ore is rated rather low grade.

The Lillie is being worked by the Foley Mining and Leasing Company, the latter having a one-year lease. About ten tons per day of high-grade ore is being shipped, which runs eight to ten ounces in gold. About 120 men are employed here.

The Pinto mine, belonging to the Free Coinage Company, is under lease to L. E. Reed & Co., and is being developed.

The Orphan Belle, on the east slope of Bull Hill, consists of four or five properties, under lease, ore shipments being made from each one. Very high grade ore is being produced. The January shipments from the Orphan Belle leases were 200 tons, which were high grade. Lessees here pay a royalty of about 25 per cent.

One of the most interesting group of properties on Bull Hill is the Isabella, consisting of the Buena Vista, Lee, Smuggler, Keith and Comet, of 160 acres on the east slope of Bull Hill. The properties, with shafts and shaft houses, form a continuous line. The Lee shaft is a model of construction and is a three-compartment, 4½x13 feet. By means of the work from this string of shafts the main vein has been opened continuously for 2100 feet and at a depth of 560 feet. It is stated that this vein is the same as that of the Victor mine, which adjoins the Isabella group on the south. The output is well graded. That designated as first class, which is very high grade, goes to the smelters for treatment; the second class to chlorination mills, and the third class to the cyanide works. A force of 185 men is employed by the company. The work of 1896 comprised 711 feet of shafts, 6048 feet of levels and 1801 fathoms of stoping. During that year the company hoisted 16,428 mine carloads of first-class smelter ore, 7088 cars of second-grade chlorination ore, 3017 cars of third-grade cyanide ore, 1571 cars of fourth-class waste and screenings and 15,516 cars of waste, making a total of 43,570 cars of material hoisted. The net profits for the year, according to the company's annual report, after deducting expenditures for running expenses and improvements, amounted to $220,114.

The Pharmacist, on the same hill, has two shafts. The depth of the old shaft is 655 feet, that of the new shaft 300 feet. Stoping has been done in all these levels. Shipments run about 150 tons per month of high-grade ore, low-grade shipments running about 150 tons per month. WASCOTT.

Victor, Col., Jan. 30, '97.

NEW MEXICO.

Silver City *Enterprise*: At Chloride Flat M. Taylor employs nine men on the Providencia and is making regular daily shipments.

At Pinos Altos Bell & Stevens are employing eight men on the Mina Grande. The drift from the south shaft to connect with the north shaft has been driven 275 feet, all the distance in ore. The Bell and Stevens mill is running steadily on ore from the Pacific.

The Golden Giant mine is working 35 men and running the mine one shift.

The Treasure Mining Company is working 50 men and running the mill night and day.

At Copper Flat the new smelting plant is nearly completed and will blow in before the 1st of March. Large ore reserves are developed in the mine and hundreds of tons of ore are on the dumps. About 50 men are employed about the mine and smelter.

ARIZONA.

Tucson *Star*: Many prospects which were known to be rich in copper have not been operated owing to the low prices being paid. In the Galiuru range east of Mammoth considerable work is being done.

At Greaterville the Rosemont people are putting up a whim and are working fifty men developing and taking out ore preparatory to blowing in the smelter.

E. Hughes is taking ore out of his copper mine and packing it over the mountain to the Rosemont smelter.

At the placers an increased output is the result of a new discovery and abundance of water.

MEXICO.

(Special Correspondence.)—The extension of the Mexican Central Railroad through the Amecan valley, Jalisco, has greatly increased the activity in the mining districts of the fifth canton of that State. Within two miles of Ameca, the terminus, are undeveloped deposits of both gold and silver ore, while a score of miles farther are rich copper mines. To encourage operations in this territory, the Department of Encouragement has appointed Senor Adolph Martinez of Ameca mining agent.

Exceptionally fine openings for mining investors are offered in the territory of Guerrero, northeast of Iguila, soon to be opened by the rapidly building Cuernavaca Railway. Ores from territory thereabouts, controlled by John F. Dawling and associates, assayed in November last 280 ounces of silver and 60% lead. Mr. Dawling expects to make his first shipments this month.

Capt. Miguel Bornio, of the La Planchas Mining Company, Sonora, has discovered a ledge of gold and silver-bearing ore about a mile from the works, measuring 5 feet in thickness and showing considerable distance. Assays have shown 40 ounces of silver and 2 ounces of gold.

J. Keefe Taylor, of the City of Mexico, has recently placed gold mining property in the State of Oaxaca with London parties; a silver mining investment in the State of Jalisco, near Ameca, with New Yorkers, and has two copper properties in Vera Cruz and Michoacin in negotiation with London and New York investors, respectively. At present Mr. Taylor is on the lookout for graphite property, which can be handled to advantage, if suitably located.

The French engineer, M. Maurite du Chatenet, is in Sonora, in the interests of French capitalists, looking into the merits of several mining properties about Cibuta owned by Senors Pierson and Holvilleur, of Mexico.

Boston capitalists are developing extensive mining properties near Unionde Tula, Jalisco, both gold and silver producing. Geo. H. Ellis of Chicago is superintending the operations.

The La Campa Mining Company, of Tucson, Ariz., are preparing to erect a 50-stamp mill on their mining property in Sonora.

The La Colorado y Las Prietas, operating in lower Sonora, have recently added two concentrating mills at their mines, for use in the cyanide process.

Unexpectedly rich showings are being made of late at the La Luz de Oro mines in Zacatecas.

There are several mines in Mexico that are reported to be extraordinarily rich in silver. One of these is in Sonora, where there is now enough gold in sight to keep the mills going for half a century. In the State of Durango Maximilian Dam has a similar property, while on the western slope of the Sierra Madre, in the same State, the International Mining Company, of which Senator Stewart of the United States is president, controls another.

Capt. Eugene Follette, of the City of Mexico, has secured, in association with other Mexican capitalists, valuable mining claims in the vicinity of Ameca, Jalisco, the ores from which assay from two to six ounces to the ton, gold.

In the territory near Tepic, Jalisco, for the last year the output of the Ahuacablan mine, in the district of Ixtlan, was 1620 kilograms of silver, value $55,922.49; 1250 kilos of silver sulphates, value $49,140.

John W. C. Maxwell of San Francisco, Cal., has been in Mexico for three weeks past on business with the Fomento department at the capital. He is also largely interested at several points in Lower California.

The Cincos Senores mines at Pozos, Guanajuato, showing 100 ounces to the ton, promise to surpass their satisfactory record of the past season. The Santa Brijida mine is also showing well of late—30% lead and 60 ounces silver.

A company is being organized at Monterey to develop recently discovered veins of silver two leagues west of that city, in the Mitras mountains.

Denver parties are negotiating for the purchase of the Las Catalanas mine of Maurice J. Cons, located in the Suiqui Grande jurisdiction, Sonora.

A new territory is being opened up in the State of Durango, about 140 miles west of the capital, near the Sinaloa line. La Providencia is the most prominent mine of this territory. Another district of promise lies some forty-five miles west of Durango, within easy reach of the Mexican International; Panuco de Coronado it is called.

Clarence King is again at the capital for a few weeks in the interest of a New York syndicate. The properties under consideration lie in Zacatecas and Guanajuato.

The Secretary of Fomento has ordered the several mining companies operating in the Corralitos mining district to suspend work upon that territory, concerning which they are in litigation with Senor Ramon Irigoyen; also to stop filling the shafts of the companies, not operating at present, with ores too poor for smelting.

The Rothschilds, who but recently secured the Bole copper mines in Lower California, are now negotiating through their representative, John H. Thurmann, for the purchase of the La Paz, Escarnacion and Espiritu Santo mines, that have produced copper for years in Chihuahua.

John B. Dickenson is working rich placer mines near Pihuma, Jalisco, some thirty-five miles from Colima, on the headwaters of the Belam river, a stream of considerable volume. On the side hills the soil has shown an average of from 50 to 60 cents per cubic meter, but in the gullies and the bed of the old river wash as high as $8 per cubic meter has been obtained.

Gold mining in the Minas Prietas district of Sonora is attracting general attention of late, because of the fine showing of the mines in operation. A great difficulty in this section is the lack of water with which to operate the mills. From this trouble the Colorado mine has been idle two years, although the Creston, close at hand, has been worked constantly, sufficient water being secured from the mine itself. Arrangements are being made to jointly bring a water supply from the mountains twenty miles away, which will probably be done by a system of canals.

In September last an English syndicate gave $1,000,000 for a three-quarter interest in the Los Amarillos and Grand Central mines, located in the Minas Prietas district of Sonora, and now they are eager to pay another million for the remaining interests therein. The output of the properties in October following the purchase was $300,000 in gold. The two mines are treating 100 tons of ore daily with two stamp mills, of twenty and ten stamps respectively.

Denver, Col., parties have just closed a deal by which they secure the Roscate gold mines, in the State of Oaxaca, at over $250,000, possion to be had about March 1st.

A syndicate, represented by Mr. Broderick of the City of Mexico, is negotiating for the purchase of the Copalguin mine in Durango, the reported figure offered being $4,000,000, of which $1,000,000 is to be paid down, upon privilege of six months' experimental working of the plant. If returns are satisfactory at the end of that time, the remainder is to be paid at once; if unsatisfactory, the $1,000,000 is returned to the prospective purchasers.

A powerful Mexican company is negotiating for the purchase of the mining property in La Piramicle, situated in the San Jose de Garcia district, Sinaloa, the reported price agreed upon being $1,500,000 (silver).

Recent results at the Flor de Maria mine, near the Sierra de Moctezuma, Chihuahua, district Bravos, show fifty ounces silver and 30% lead. The mines are about twenty-five miles from Moctezuma station, on the Mexican Central.

Official reports from the State government of Sinaloa show the principal minerals of the State to be gold, silver and copper. There are in operation six concerns of the first class, reducing 144,000 tons of ore, valued at $4,300,000, or $30 per ton; ten concerns of the second order, reducing 48,000 tons, at $50, amounting to $2,400,000; besides a number of smaller operations not considered. Results in the gold mining district of San Jose de Garcia are exceeding $8,000,000 per year.

The production of the mines of the Sierra Mojada region, Saltillo, according to the report of the Jefe Politico filed with Governor Cardenas, and covering the period from Oct. 1, 1893, to Dec. 31, 1896, was in total $12,887,227.71. This report dealt with twenty-three mines.

Extensive improvements will be observed the coming season at the mines of the Neuva Parena Mining Company, operating the Almania and Parena mines near Monterey, in the Sierra la Ventana.

The Michoacan Mining & Milling Company, operating near Coalcoman, on the upper western spur of the Sierra Madre del Sur, are preparing for extensive increase in their operations the coming season.

Scientific Progress.

Calcium Carbide: A New Reducing Agent.

Since the introduction of this remarkable substance it is significant that scientific men have been content to allow the product to rank solely as a water decomposer, and thus regard the production of acetylene the only available product.

Researches of a somewhat lengthy description, which have lately been carried out at the above laboratory, involve the use of calcium carbide as a metallurgical reducing agent.

In the first instance an excess of litharge was heated to redness in contact with the carbide, in a clay crucible, the reaction being accompanied by vivid incandescence, resulting in the formation of metallic lead and calcium oxide, CaO.

A further portion was now selected, in which the proportion of carbide excelled that of the litharge; this was further subdivided into various smaller portions, each portion being exposed to various temperatures, resulting in a regulus of calcium and lead of varying percentage, together with the expulsion of CO_2.

The alloys thus formed are more or less brittle, and to a certain extent sonorous when struck, their melting point ranking below that of pure lead, and are slowly, but completely, decomposed in contact with aqueous vapor, the reaction being much less energetic than that afforded by alloys of lead with the alkaline metals. Stannic oxide, cupric oxide, and also ferric oxide, at corresponding higher temperatures, were readily reduced, yielding results of no practical value; in the case of the cupric alloys those samples containing under 1 per cent of calcium being rendered cold-short and breaking under very small strain, whilst, on the other hand, iron containing calcium approaches in appearance that of ferro-manganese, being even more brittle and very oxidizable in contact with water.

In a further operation oxides of manganese, nickel, cobalt, and even chromium, molybdenum and tungsten, were readily reduced, yielding calcium alloys. Results of experiments, comprising the reductive action of the carbide upon the earthy chlorides and their haloids, will be shortly to hand. The already partial success of these reactions seems to point most conclusively towards a new and powerful reducing agent, which at the same time, considering the market value of the carbide in question, could not fail to replace both sodium and potassium.—H. N. Warren in Chemical News.

Tetanus Antitoxin.

Consul General Frank H. Mason, writing from Frankfort-on-the Main, says that from the evidence presented it would appear that tetanus, if not already conquered, is in a fair way to be successfully overcome. In the *Deutsche Medicinische Wachenschrift* (Berlin) for October 23rd appears a joint announcement by Prof. Dr. von Behring of diphtheria-antitoxin fame and Prof. Knorr of Marburg, describing the qualities and best methods of using the new tetanus antitoxin, which is now prepared under Government supervision as a commercial product by the Farbwerke at Hoechst-on-Main, and offered for use by medical practitioners under the same conditions as diphtheria antitoxin from the same source.

Tetanus, as is well known, is an exceedingly painful and hitherto usually fatal disease caused by blood poisoning, generally the result of a wound. It is believed by physicians to be caused by the introduction into the system of a minute organism which rises from the ground in certain localities, so that the prevalence of tetanus varies greatly even in different districts of the same country. At all events, the disease has its characteristic microbe, which has been recognized, isolated, described and reproduced by artificial culture. The distinctive symptom of tetanus is a persistent spasm of the voluntary muscles, aggravated by light, noise or other disturbing influence to which the patient may be subjected. These spasms may affect any muscular portion of the body, but when, as is often the case, the maxillary muscles are principally attacked, the resulting malady is known as lockjaw.

The tetanus antitoxin described by Profs. von Behring and Knorr is similar in nature, action and in the methods of its preparation to the antitoxin of diphtheria.

THE penetrating powers and ranges of powerful lights, such as are employed in lighthouse service, rapidly decrease as the ratio of their luminous power increases. For instance, a light of 5,000,000-candle power in the British channel has in average weather a luminous range of about forty-four nautical miles, while if the light be increased to the power of 10,000,000-candle the luminous range is only five miles more, or forty-nine miles. According to current practice, lights up to 200,000-candle power are obtained by means of mineral oil lamps, while electric lights are used for higher powers, and almost any power may thus be obtained. The highest power yet attempted is about 36,000,000, at Penmark point, in the department of Finisterre, France, which, when completed, will be the most powerful lighthouse illumination in the world. The height of the tower in which it is to be located is about sixty-three meters, enabling it to be seen during the day from a distance of eighteen miles in fine weather. During the night this light will be visible for sixty miles. The rotundity of the earth will prevent the rays from striking the eye directly at a distance of more than thirty miles, but the sky overhead will appear illuminated for thirty miles more. The estimated cost is about $120,000.—Machinery.

HENRI MOISSAN finds that important alloys can be obtained by taking advantage of the ease with which metallic oxides are reduced by aluminum. His general method appears to be to bring aluminum into a molten condition, and then to throw into it a mixture of aluminum filings and of the oxide of the metal which it is desired to alloy. A further energetic development of heat takes place, with the result that the most refractory oxides are reduced. By means of this method Moissan has succeeded in preparing alloys of aluminum with nickel, molybdenum, tungsten, uranium, titanium and chromium. The advantage of mixing tungsten, etc., with steel is well known, and Moissan states that not only this substance, but titanium also, can be introduced into Siemens-Martin steel. Many chemical substances when heated in the electric furnace give some very astonishing results, and in some cases they become transformed into minerals which up to the present have only been met with in nature.

THE late Dr. Alfred Nobel's bequests should do much for the progress of science. At any rate, magnificent rewards will accrue to the best discoveries. According to the terms of his will, a fund is to be formed from all his realizable property, the yearly interest from which is to be divided into five equal portions. The first of these is to be allotted as a prize for the most important discovery in the domain of physics. The second is for the principal chemical discovery or improvement. The third is for the chief discovery in physiology or medicine. The fourth is for the most distinguished literary contribution in the same field, while the fifth is to be allotted to whomsoever may have achieved the most or done the best to promote the cause of peace. All these prizes are open to Scandinavians and foreigners alike. After deducting a few bequests to individuals, it is expected that the fund thus devised to the cause of progress will amount to the sum of 35,000,000 kroner, or nearly $10,000,000.

Electrical Progress.

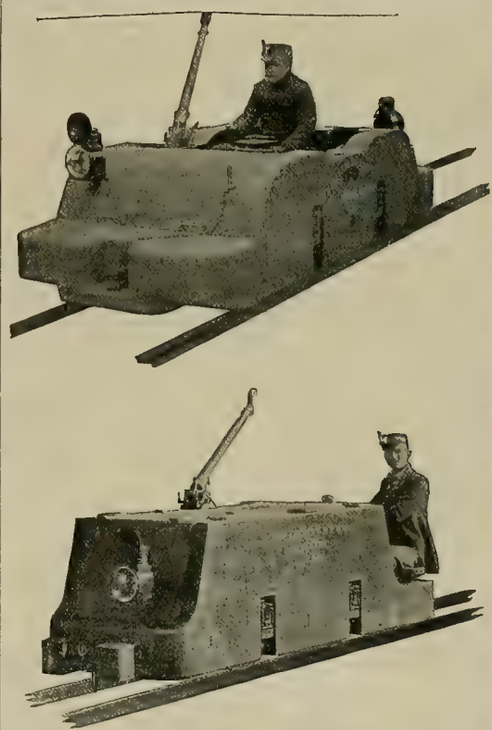
Jeffrey Coal Mining Machinery.

The illustrations herewith represent some of the Jeffrey specialties in the line of coal mining machinery. The words "Jeffrey" and "Successful power coal mining machinery" are synonymous, and, while the mining public in general are familiar with their manufacture, we illustrate herewith their latest coal cutter and mine locomotive, which are the culmination of many years of experience. The chain coal cutter, in simplicity, efficiency and design, is claimed by the manufacturers to be superior to all other makes. The machine is operated by electric or air power, and the daily work will average anywhere from 100 to 200 feet face, the undercut being either 5, 6 or 7 feet, according to the length of machine used.



THE JEFFREY COAL CUTTER.

The Jeffrey mine locomotives, wherever used, are reported to effect a great saving in the cost of production, the illustrations herewith showing the style made by that company. The one with man in center is preferred in many instances, while the one with controller on end is equally desirable. These locomotives are used for mine as well as surface work, and are designed for various capacities. The Jeffrey Company issue a complete catalogue descriptive of their machinery, which can be had by addressing them at Columbus, New York, Chicago or Denver.



JEFFREY MINE LOCOMOTIVES.

Incandescent Lamps.

The making of an incandescent lamp requires more than thirty distinct processes, most of which affect its quality rather than its appearance. The character of the filament, the way it is flashed and the exhaustion may generally be said to have most to do in determining the quality, but the defect in a lamp may be traced to a defect in either the filament, the glass, the platinum, even the base, or due to poor workmanship in any of the several processes in putting them together.

As light is the only useful product, the incandescent lamp may be said to have a real efficiency of from 3 to 5 per cent, the rest being wasted in heat. An incandescent lamp may be operated at such a low voltage as to give heat but no light. The filament that will stand the greatest degree of heat without vaporizing, other things being equal, is the best.

It is customary to state as the efficiency of an incandescent lamp the watts of energy required to produce one candle of light. By increasing the voltage we increase the light more than in proportion to the increase in the energy consumed and the lamp is then said to be more efficient. For example, a lamp giving 16-candle power of light at 100 volts pressure and consuming 56 watts of energy we would call a 3½-watt lamp. If we should increase the voltage to 110, the candle power would be increased to 28, the energy consumed to 70, the watts per candle would then be 2½ and we would call it a 2½-watt lamp. There is no difference in the lamp itself between what is termed a 2½-watt lamp and what is termed a 3½-watt lamp.

As lamps are operated at a higher efficiency, their defects become more apparent. If one is satisfied to operate a lamp at an efficiency of 6 or 7 watts per candle (and such lamps are made and sold), what is in reality a very bad lamp may give a customer good satisfaction.

The life of an incandescent lamp will be shorter as it is operated at a higher efficiency, or in other words at a higher voltage. For example, if at 3½ watts a lamp would have a life of 2400 hours, at 3 watts it would perhaps have a life of 1000 hours and at 2½ watts a life of 350 hours.—F. S. Terry, before the Northwestern Elect. Ass'n.

Ocean Telephony.

The following interview with Thomas A. Edison is taken from the New York *Herald*. Mr. Edison was first asked:

"If you were backed by a $10,000,000 syndicate, would you undertake to construct a practical working telephone across the Atlantic ocean?"

"It is impossible," he replied.

"There is a Russian who has telephoned under ten miles of water, and who claims that he can easily telephone across the Atlantic ocean. He is being backed by a syndicate and it is said that work will shortly be commenced on a submarine telephone cable."

Mr. Edison figured a little, and said:

"The difficulty of telephoning increases according to the square root of the distance. He telephoned ten miles under water, did he? Well, he must have had some little trouble. At ten miles his difficulties are, we will say, one. At twenty miles his difficulties would be four. Then they would run up as follows:

At 40 miles	16 times as hard;
At 80 miles	64 times as hard;
At 160 miles	256 times as hard;
At 320 miles	1,024 times as hard;
At 640 miles	4,096 times as hard;
At 1,280 miles	16,384 times as hard;
At 2,560 miles	65,536 times as hard.

"This is about the distance across the

Atlantic ocean. Now, if that Russian can overcome a job 65,000 times as hard as telephoning under ten miles of water, he may possibly telephone across the Atlantic ocean. It is not a question of battery, but of leakage and the overcoming of resistance and the impossibility of getting rid of the current at the moment the voice ceases. Such a distance, especially such a submarine distance, affords entirely too clumsy a channel for the quick and variable current necessary to a telephone wire. As I said before, it is not a question of battery. Why, with the battery now on the Alantic cable I can run a fan motor at either end. At the same time the speed of the motor could not be varied quickly enough to make its starting and stopping a matter of a few seconds. Taking these things into consideration, I am afraid the eminent Russian has a heavy job ahead of him. If I could erect poles three miles high I would undertake to telephone around the earth. As you approach the earth, however, the difficulties increase greatly, and they are of such a nature that I am afraid they can never be overcome—at least, not with present human intelligence."

Electric Power in Gold Mining.

In the gold mining districts of western Australia, particularly the Coolgardie region, the Westralian Electric Company proposes to follow the example of California and Colorado, and apply electric power transmitted over long distances.

At the Rand Central Electric Works, which applies electric power to the gold mines of the Rand, South Africa, the capacity of the plant, about 2000 H. P., has been applied for at an average of about £45 per H. P. per annum delivered, including wires and fittings. There are four three-phase generators in position, direct driven by vertical triple expansion marine type engines, having a maximum brake H. P. of 1200. Each dynamo weighs eighty tons and is constructed in four pieces. Eight multi-tubular boilers, with 200 tubes each, supply the steam. Each is of 600 H. P. and has 3300 square feet of heating surface. Only three sets of the plant will be worked at first, the fourth being held in reserve for a time. Some of the mines supplied are situated over twenty miles from the generating station. Current is generated in the dynamos at 700 volts, is raised by means of step-up transformers to 10,000 volts, and at the mines is reduced by step-down transformers to 120 volts for lighting and 240 to 500 volts for motor work.

D. TOMMASI, in a paper published in *Moniteur Scientifique*, describes a new process of electrically separating and refining metals, of which the following is a brief abstract: The anodes are either cast plates or granulated material, resting in direct contact with the positive leads. The cathode is a vertical disk, capable of rotation about its horizontal axis. Only the lower portion is immersed in the electrolyte, and the upper part is passed during rotation between scrapers that effect the removal of any spongy deposit, transferring it to channels by which it is conveyed to a convenient receptacle. The disk is constructed in replaceable sectors, when a reguline deposit is to be obtained, and the sectors are one by one removed mechanically as they attain sufficient thickness, and are plunged beneath a fluid bath of the metal under treatment until the deposit has been melted away and the sector is ready for use again. A solid disk is preferred for spongy deposits. The advantages of this arrangement are that polarization is prevented by the rotation of the cathode and by the action of the scrapers, and the liquid is sufficiently agitated to prevent separation into layers of different density, whilst spongy deposits are removed as fast as they are produced, thus preventing oxidation by the liquid and the occurrence of local action. At the same time the electrodes may be allowed to approach more closely, owing to the impossibility of short-circuiting through irregularity of deposit, and the resistance of the bath is therefore sensibly diminished.

Mechanical Progress.

The River Dredger.

The following is a general description of the dredger which it is proposed to use in the Sacramento river:

The machine will go through a sandbar at a speed of from five to ten feet a minute, cutting its way through a solid bank and leaving behind it a channel forty feet wide and twenty feet deep. Of course, it could not do its work at such an amazing rate as this if it were not for the water which it has to work with. That is the secret of the whole performance.

In front of the machine are six intake pipes, turned downward. Surrounding each of these is a cylinder fitted with knives, which is kept in revolution all the time, so that the knives cut and chew up the sand and mix it with the water. This process, it should be remembered, goes all around the intake pipes, and in these pipes the suction of great steam-driven centrifugal pumps is pulling away at the loosened mass of sand and water. It is easy to imagine the result. Great solid streams of debris flow in the pipes at a rapid speed. The hydraulic engineers have calculated the speed to a nicety. They know to the fraction of a foot what speed the current must have through those pipes in order to carry the sand in solution.

Thus the problem of maintaining a channel in the Mississippi river at low water is solved. Where there is now but four and one-half feet of water in the autumn there will be, after a few of these dredges have been put to work, fourteen feet. In two years it is possible to have fourteen feet of water from St. Louis to the sea every day in the year. Five hydraulic dredges will do the work if employed four or five months a year at a cost of $10,000 a month each. This is almost magic—modern magic.

The significance of this achievement is that the problem of maintaining low-water navigation in all alluvial streams is solved. It is applicable to the Missouri, to the Illinois, to the Sacramento, to the Volga, to the Danube, to the Dnieper, to the Hoogly in India, to the La Plata, to rivers in all parts of the world. It is thought that no invention or achievement since the development of steam navigation has done as much for water transportation upon rivers as this successful application of hydraulics to river-bed dredging will do in the near future.

Carbolic Acid for Tempering Steel.

M. Levat recommends in *L'Industrie* the use of carbolic acid for tempering steel tools. In testing two cold chisels, he tempered one in water, the other in a solution of carbolic acid, after both had been heated to a cherry red. The chisels were set to work on extra hard wrought iron. The one tempered in water became notched after a short time, the one tempered in carbolic acid remained perfectly intact. The second test was made with two puddle steel bars, which were heated to white heat and tempered in water and carbolic acid respectively. The bar tempered in carbolic acid showed a much finer fracture, which reflected like a mirror when filed. The carbon contents were not increased, but in the bending test the bar tempered in carbolic acid showed more elasticity and pliability than the other, while its hardness made it more suitable for tools, as chisels, drills, etc.

WM. EVANS of Silver Bow, Montana, personally acquainted with the risks of a miner's life, has interested himself in an attempt to protect them from liability to accident by the introduction of a bill in the Montana Legislature providing that all cages in mines over 300 feet in depth shall be cased in. Heretofore the casing in of cages has been considered impracticable by many mining men, but he figures that the change can be accomplished with little cost. He says that a steel, iron or wire casing can be attached to any cage at a trifling cost. The casing might be swung on hinges or on rollers and should be 5 feet high. The doors might be made to swing inward, so that they could be fastened when ore was being hoisted. Another section of his bill provides that the safety dogs be inspected at stated and frequent intervals and kept in good order.

A FRENCH inventor is reported to have formulated a scheme to insure the safety of trains traveling in the same direction on the same line of rails. Briefly, the appliance consists of a series of electro-magnets, which operate the whistle and the automatic brake, by which means a given distance can be maintained between the trains. In connection with these are appliances which give an approximate idea of the distance of one train from the other. It is said that warning can be conveyed to a distance of from 600 to 1000 meters, and that the system is applicable to points and level crossings.

Practical Information.

Eastern Chinese Railway.

The details of the agreement between Russia and China regarding the construction of a Chinese eastern railway has been reported to the State Department by Consul General Karel, at St. Petersburg. The articles of association of the new company were sanctioned by the Czar in December last, and by an imperial ordinance issued December 23rd. The details of the arrangement are in the main as follows:

The association has been organized under a convention concluded August 27th, 1896, by the Chinese government for the construction and exploitation of a railroad within Chinese territory from a point on the western frontier of Heilung Chung to a point on the eastern frontier of Kirin, and to be connected with the Russian-Siberian line. The company is granted concessions to work coal and other mines and to conduct industrial and commercial enterprises in China in connection with the railroad, or separately. An important stipulation provides that shares can be held only by Russian and Chinese subjects. The company will own the road eighty years after the opening of the whole line. The Russian government guarantees the resources of the company to the extent of making obligatory the payment of shares. The capital stock of the road has been fixed at 5,000,000 paper roubles ($2,570,000), divided into 1000 shares, but bonds will be issued as required. The company must begin work in August, 1897, and the line is to be completed in six years. The total length of the Manchurian line will be 1273 miles, of which 945 is in Chinese territory, and it saves 341 miles over the old line to Vladivostock.

Aluminum on Warships.

Experiments at the imperial navy yards at Wilhelmshafen have shown conclusively that aluminum cannot be used practically in men-of-war construction, while aluminum bronze has turned out satisfactorily in many cases, when the alloy contained 94–96 per cent of aluminum and 6–4 per cent of copper. After investigating and testing aluminum in certain parts of vessels the following conclusions were arrived at: Aluminum bronze is useless for bearings, valves, etc., on account of the rapid wearing away; it has been found useful, however, for various parts of machines where friction is not an important factor, and also in cases where light weight is an object. Furniture made of aluminum showed decidedly too little resistance and required frequent repainting. Aluminum shows, furthermore, but little resistance to sea water, thus making it useless for the walls of vessels. A 10 per cent aluminum bronze, however, stands a fair chance of being freely used as soon as the price of aluminum can be sufficiently reduced to approach the value of cast steel.—Engineering Magazine.

ACCORDING to statistics recently furnished by Dr. James Wood, of Brooklyn, of all the patients applying for treatment at the chief dispensary of that city, no less than 10 per cent are tea drunkards. They are not aware of the fact, but the symptoms of their cases point unmistakably to over-indulgence in tea, and that presumption, on inquiry, is confirmed by their confessions. They suffer from headache, vertigo, insomnia, palpitation of the heart, mental confusion, nightmare, nausea, hallucinations, morbid depression of spirits, and sometimes from suicidal impulses—surely a formidable list of symptons. These patients are of both sexes and all ages, and confess drinking from a pint and a half to fifteen pints of tea each day.

IN Belgium a good deal of attention is being paid to the question whether incandescent gas lighting cannot be made more intense by auxiliary means, such as raising the pressure of the gas in blow-through burners by means of small hot-air motors, carbonic acid motors, or turbines and compressors driven by town water. The result is at present doubtful, for it is a question whether the gain is not more than counterbalanced by the increased cost and trouble.

THE Niagara electric power plant may be outdone in Africa. It is proposed to utilize the water power of the Victoria falls, on the Zambesi river, with the object of using the power to generate electricity and supply it to the various centers of population throughout Rhodesia, either in the form of power to work stamps and mills or of motive power for other purposes. Dr. Hopkinson and Professor Forbes have reported favorably on the scheme.

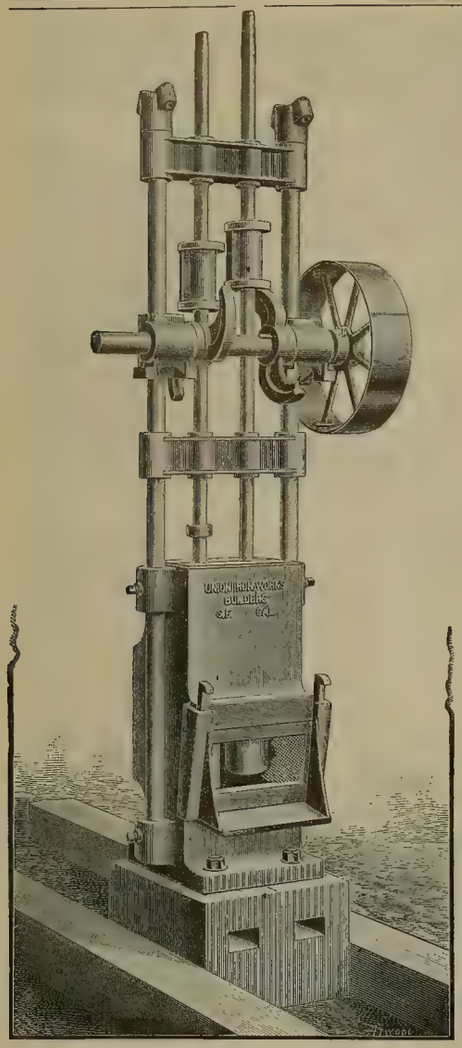
THE British and Australian sovereigns are 18-carat fine and are now both exactly alike. In 1870 a process was adopted in the Sydney mint, so that all the silver is now taken out. Sovereigns coined in Sydney before 1870 are of a light color and easily distinguishable from British sovereigns, simply because all native gold contains more or less silver; and this was retained in the coin until means of removing it were adopted.

BEFORE the Isthmus of Suez was pierced by the canal there were scarcely any sharks in the Mediterranean, the passage through the Straits of Gibraltar not being to their liking. Now, however, they come in by way of the canal and in such numbers that in more than one watering place on the Mediterranean, and also on the Adriatic, the sign has gone up: "Beware of sharks."

HERR LAUR argues that petroleum originates in the decomposition of subterranean carbides by water, so that the process must be a continuous one. Such carbides as that of aluminum would favor the formation of natural gas; such as that of uranium would favor that of liquid products. The nitrogen in crude petroleum would, on this view, not be of animal origin, but would be due to nitrides.

GERMANY seems to be forging ahead in the race for industrial greatness, if not supremacy. She already stands second among the nations in the value of her exports and imports. Official figures put her exports and imports for 1895 at $1,926,729,000; England's were $3,125,820,600; France's $1,366,167,600, and the United States' $1,544,770,000.

WE are all anxious to discover a true weather indicator—one that is strictly up to date. Not many know of the following method: Go out and gaze upon the smallest cloud you see; if it decreases and disappears, it shows a state of the air that is sure to be followed by fair weather; but if it increases, you may expect rain.



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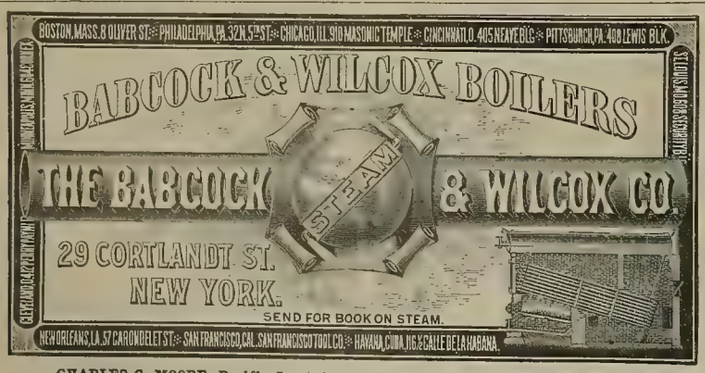
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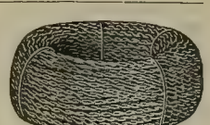
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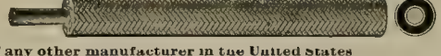
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Coast Industrial Notes.

There will be launched to-day in Seattle, Wash., from Moran Bros.' establishment, the Government revenue tug Golden Gate for use in this harbor. The Golden Gate is the first steel vessel built on Puget Sound, and the launching will be an affair of a semi-official nature.

President Edgerton, head of the Scotch syndicate which is to dam the Rio Grande near Fort Selden, N. M., has gone to London to present his final report to the capitalists who are back of the enterprise. With two possible exceptions this is to be the largest water storage reservoir in the world. It will cost nearly $2 000 000 and will irrigate 200,000 acres of Rio Grande valley land between Fort Selden and El Paso.

The San Francisco and San Joaquin Valley Railroad Company has let a contract for grading south from Fresno, a distance of 30 miles, to Hanford. The directors have decided to build the Hanford extension to Bakersfield before the line by the way of Reedley and Visalia to Bakersfield, but work on the latter extension will be started as soon as rights-of-way disputes are settled. According to the contract, grading must be completed by June 17, 1897.

Personal.

HARRY B. ADSIT has been appointed general superintendent of the Tomboy mine at Telluride, Colorado.

JOHN BYRNE of Butte, an experienced miner, has been appointed State Mine Inspector by Governor Smith of Montana.

T. J. NOLTON has been appointed superintendent of the Klamath Flume and Mining Company, in Siskiyou county, California.

FRANK W. PAGE, of the Summit Mining Company, which recently paid $50,000 for the Fortuna mining claims, near Nevada City, Cal., will put an electric plant thereon.

A. D. SCHINDLER, who has been chief draughtsman for W. B. Storey, chief engineer of the San Francisco and San Joaquin Valley Railroad Company, has been appointed division superintendent at Stockton.

PRINCE FEDOR SHADRIN, who owns large placer properties in Russia, and M. Shagoloff and M. Krasilnichoff, who are engineers, have been looking into the methods in vogue in the hydraulic mines of Trinity county, California.

R. A. F. PENROSE, president of the Pearce, Arizona, G. M. & M. Co., is in San Francisco to get considerable machinery for the mine. The property has paid from the start. It is fourteen miles from Bisbee and will be thoroughly equipped.

Commercial Paragraphs.

WHILE the Link-Belt Machinery Co., Chicago, are not at the present time overcrowded with work, they are running their regular force full time. During the past few weeks a gradual improvement has developed and the signs point to increased activity in all departments within a short time. They have, among others, closed contracts with the following concerns: Gilmour & Co., Trenton, Ontario (the largest saw mill in Canada), one 750 H. P. rope drive, which includes one 14-foot fly wheel, shears (weight 40,000 pounds), etc.; C. T. Roenitz Leather Co., Sheboygan, Wis., 235 H. P. rope drives; Baltimore & Ohio S. W. Railway, Zaleski, Ohio, complete coal washing plant, including crushers, screens, elevators, conveyors, etc., having a capacity of cleaning 450 tons soft coal per day; and are now completing the installation of a 600 ton coal washing plant for the Crabtree mine of the Alexandria Coal Co., Greensburg, Pa.

THE Mine and Smelter Supply Company, Denver, Colo., have recently put in Wilfley concentrating tables in the Standard concentrating mill at Wallace, Idaho. They report having shipped four of these tables to Georgia.

Recent California Mining Incorporations.

Sliger Con. G. M. Co.; P. Maslin, W. H. Brown, E. A. Curtis, C. W. and W. P. Keeney; capital stock, $100,000—$50,000 subscribed.

Excelsior Mining Co., San Francisco, Cal.; capital, $100,000—$3020 subscribed; D. A. Donelson, C. Williams, A. T. Sherwood, G. T. Emery, J. B. Whitney.

Deseret G. M. & M. Co., Los Angeles, Cal.; capital, $100,000—$96,000 subscribed; J. W. Park, Banning; R. E. Dill, F. L. Hossack, D. D. and G. W. Whitney, Los Angeles.

Black Hawk Gravel Mining Company, San Francisco, Cal.; capital, $100,000—$45 subscribed; C. H. Crocker, B. B. Brewer, F. A. Smith, H. O. Wiedero, J. W. Rooch, San Francisco.

Recently Declared Mining Dividends.

Utah Mining Co., Utah, 2 cents per share, $2000; total to date, $175,000.

Silver King Mining Co., Utah, 25 cents per share, $37,500, February 8th.

Silver King, Utah, $37,500; payable Feb. 8. The payment of this dividend, which is the second that has been posted the present year, will increase the total to $937,500.

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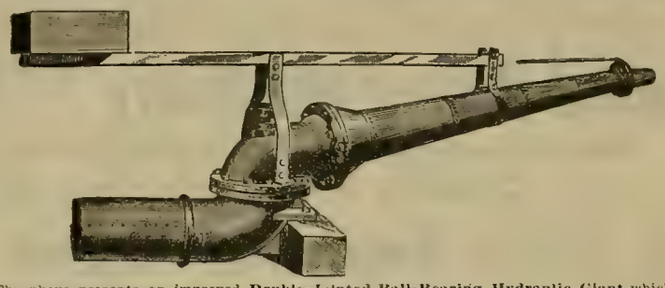
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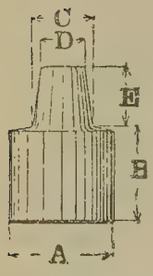
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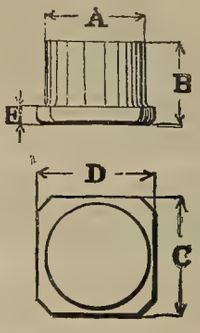
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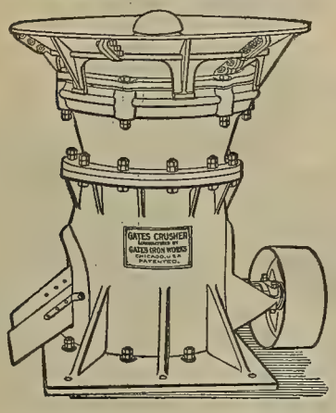
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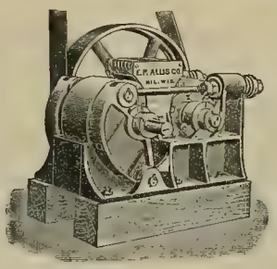
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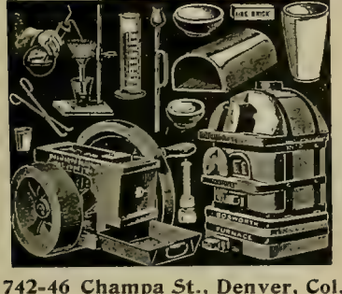
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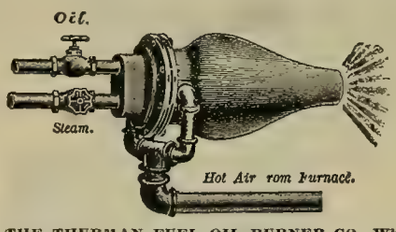
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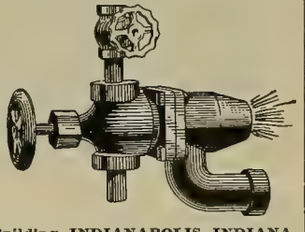
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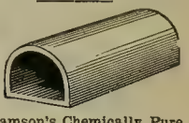
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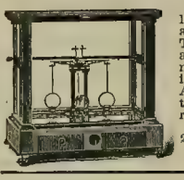
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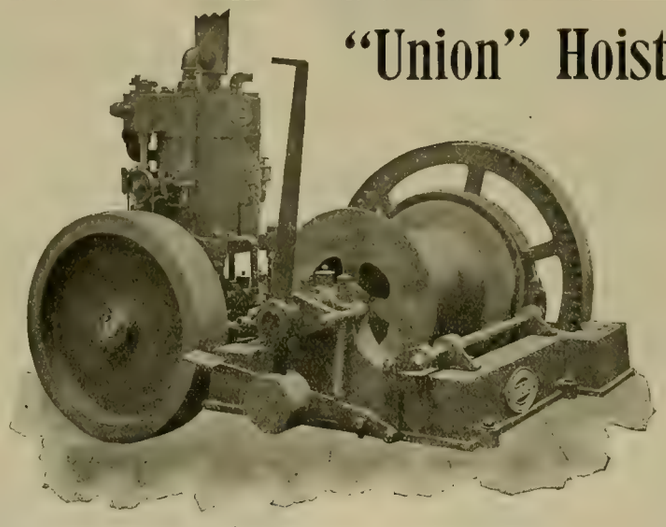
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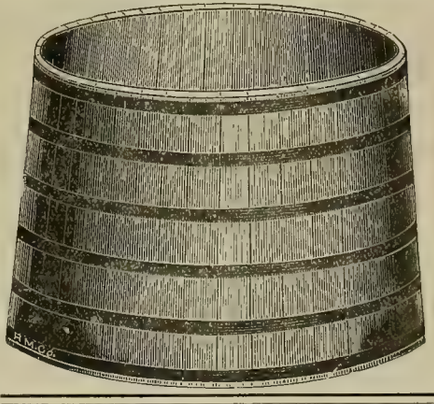
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List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING FEBRUARY 2, 1897.

576,422.—STEAM SCRAPER—J. Austin, S. F.
576,086.—MUSIC TURNER—J. F. Blasauf, S. F.
576,427.—TYPE-WRITING MACHINE—J. Bonner, Tiburon, Cal.
576,515.—TIMBER RAFT—A. J. Burcham, Woodland, Cal.
576,536.—SASH LOCK—Carson & Paterson, S. F.
576,090.—ROTARY ENGINE—R. S. Case, Pasadena, Cal.
576,260.—BUILDING BLOCK—E. G. Durant, Pasadena, Cal.
576,109.—WRENCH—W. G. Gilmour, Oakland, Ogn.
576,315.—STOVE AND CANE—C. V. Gordon, Los Angeles, Cal.
576,308.—BREAD CUTTER—J. Habrle, S. F.
576,118.—EXTRACTING GOLD, ETC.—W. F. Heathman, Santa Ana, Cal.
576,315.—SHADING PEN—A. O. Horton, Bridge, Ogn.
576,120.—CAN-MAKING MACHINE—R. D. Hume, Gold Beach, Ogn.
576,121.—CAN-MAKING MACHINE—R. D. Hume, Gold Beach, Ogn.
576,122.—CAN-MAKING MACHINE—R. D. Hume, Gold Beach, Ogn.
576,123.—CAN-HEADING MACHINE—R. D. Hume, Gold Beach, Ogn.
576,124.—CUTTING MACHINE—R. D. Hume, Gold Beach, Ogn.
576,125.—CAN-HEADING MACHINE—R. D. Hume, Gold Beach, Ogn.
576,195.—SEPARATOR—R. W. Jessup, S. F.
576,129.—ADVERTISING DEVICE—L. Julig, S. F.
576,132.—CURRENT WHEEL—A. Kruse, S. F.
576,272.—HYDROCARBON BURNER—J. E. Larson, Los Angeles, Cal.
576,138.—LEMON SQUEEZER—F. R. Miner, Los Angeles, Cal.
576,231.—STEERING GEAR—F. E. Schofield, Everett Wash.
576,283.—CAR FENDER—I. O. Stephens, Oakland, Cal.
576,170.—MANUFACTURING GAS—J. L. Stewart, S. F.
576,491.—CAR FENDER—E. West, S. F.

NOTE.—Copies of U. S. and Foreign patents furnished by Dewey & Co. in the shortest time possible (by mail for telegraphic order). American and Foreign patents obtained, and general patent business for Pacific Coast inventors transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

CAR FENDER.—Ira O. Stephens, Oakland, Cal., assignor of one-half interest to Charles L. Clough, San Francisco, Cal. No. 576,283. Dated Feb. 2, 1897. This invention relates to that class of car fenders in which an independently acting spring or yielding bars are employed. It consists essentially of independent curved-spring yielding bars, projecting outwardly from the front of the car, to which the upper ends are attached, having rear extensions underlying them and adapted to move lineally, with stops to limit the amount of movement. These underlying bars have shoes fixed to their forward ends to form a riding surface when the device is depressed to form contact with the roadway.

BREAD CUTTER.—Jules Habrie, San Francisco, Cal. No. 576,308. Dated Feb. 2, 1897. This invention relates to a device which is especially adapted for cutting bread and other substances into slices. It consists essentially of a trough or guide to receive the bread, a shaft journaled longitudinally above the trough, a cam-shaped cutting blade fixed to the shaft, transverse guides secured at opposite ends to the frame and spanning the trough and between which the blade is movable, a feed board projecting upwardly into the trough behind the loaf or article to be cut, having a rack fixed to it, a transverse shaft, a pinion on one end to engage the rack, a ratchet wheel fixed upon the opposite end of the shaft, a spring-actuated pawl engaging the ratchet wheel, a cam fixed on the main shaft and intermediate mechanism actuated by the cam, whereby the pawl is oscillated backward and forward to turn the ratchet wheel and thus advance the loaf or article to be cut by successive movements previous to each cut made by the knife. The knife is preferably in the shape of a cam, fixed to the longitudinal top shaft, and when moved downward it makes a drawing cut, which is very effective in cleanly slicing the bread or other article which is being cut. The cutter is so made that it ordinarily will not cut entirely through the loaf, but will just leave the lower crust connected at one point, so that the slices remain attached together; but if it is desired to cut entirely through, a false bottom can be placed in the trough, having a transverse channel into which the knife enters, and the cut will then be complete.

SEPARATOR.—Robert W. Jessup, Los Angeles, Cal., assignor of one-half interest to Fairfax H. Whelan, San Francisco, Cal. No. 576,195. Dated Feb. 2, 1897. This invention relates to that class of separators employing screens arranged in series in a passage provided with directing and stop plates whereby the material is delivered to the successive screens and the particles are kept apart. It is particularly adapted to separation from wheat of oats, chess, sweet clover, mustard and other small kernels. It consists essentially in the combination of a screen composed of parallel-spaced needles, having a fixed connection at one end, and thence extending separate and independent to the other end, and free at said end, said needles being pliant and springy and adapted to vibrate under the contact of the material and its passage over them, an inclined directing plate in front of the screen to deliver the material to it and an inclined stop-plate behind the screen to keep apart the separated materials.

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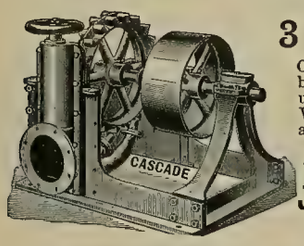
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Adapted to all Heads from

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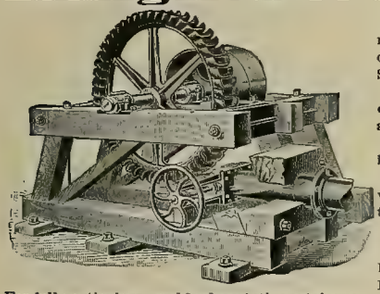
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Knight's Water Wheel.



The accompanying cut shows the general arrangement of **Knight's Standard Water Wheel**, of which there are **hundreds in use** in different States of the Union.

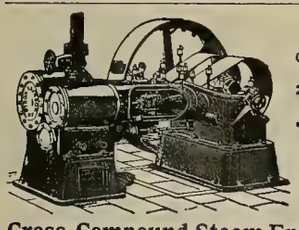
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Wheels inclosed in iron cases, from 6 to 24 inches.

Wheels for electrical power can be furnished **with or without Governors. Highest regulation guaranteed.**

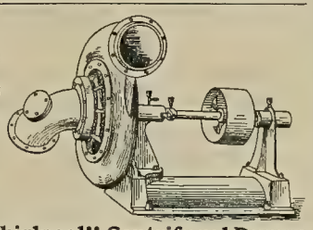
For full particulars, send for descriptive catalogue.

Address all communications to
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Cross-Compound Steam Engines and "Whirlpool" Centrifugal Pumps

For Irrigation, Drainage, Dredging, Mining, Etc. Capacities from 50 to 50,000 Gallons Per Minute.

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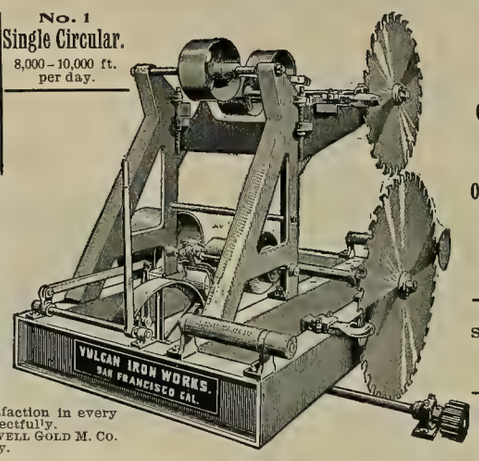
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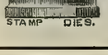
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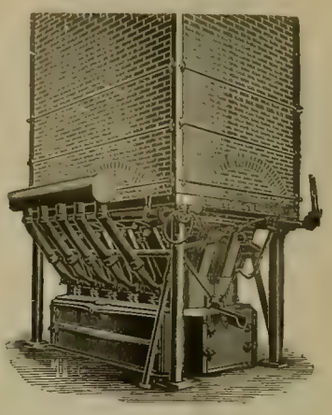
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THIS TRAMWAY IS THE BEST THAT HAS EVER BEEN PLACED ON THE MARKET. IT HAS NO RIVAL. IT IS STRICTLY AUTOMATIC AND ITS CAPACITY RUNS UP TO 1000 LBS. PER BUCKET. ANY ONE CONTEMPLATING THE ERECTION OF A TRAMWAY SHOULD INVESTIGATE ITS MERITS BEFORE PURCHASING ELSEWHERE. . . . . .



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Equipped with Arch-Bar System of Mantles, insuring rigid and strong walls. No Cracks.

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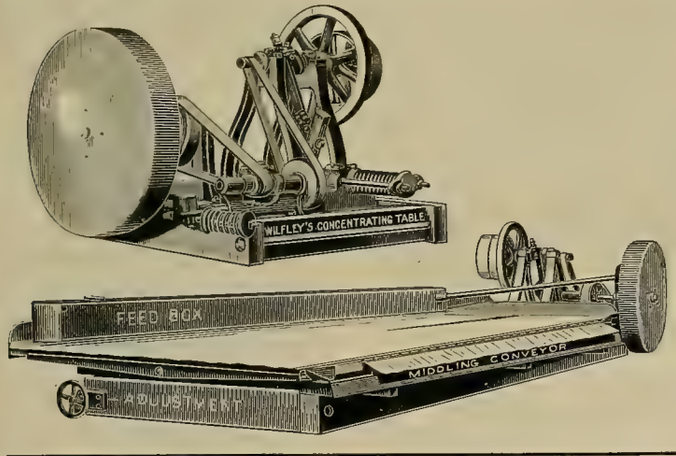
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And claim for it BETTER work than any Concentrator made, with a capacity of from 15 to 25 tons per day of 24 hours. It is simplicity itself. No moving belts or intricate parts. Anyone can learn to operate in an hour.

For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Col.; M. E. Smith Concentrator, Golden, Col.; Mary Murphy Mine, St. Elmo, Col.; W. E. Renshaw, Mayflower Mill, Idaho Springs, Col.; W. H. Bellows, Boyd Mill, Boulder, Col.; H. E. Woods, Denver, Col.

ROMLEY, COLO., Jan. 19, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Answering yours of the 5th inst., would state that after a thorough trial we have discarded nine other concentrators and adopted the Wilfley Concentrating Table, which we think up to date is the best table in the market, so far as our knowledge is concerned. Yours very truly, [SIGNED] B. B. MORLEY, M'g'r Golf M. & M. Co.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

PRICE, $450.00.

THOUSANDS Now in Use Over the World.



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THEY ARE THE BEST AND CHEAPEST.

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Pat. Jan. 5, '92, Aug. 27, '95. *Send for Catalogue.* Sacramento, California.

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Also, Best Refined Cast Tool Steel, Well Bit Steel, Heavy and Light Iron and Steel Forgings of All Descriptions.

PRICES UPON APPLICATION.

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Market Reports.

The Markets.

SAN FRANCISCO, Feb. 11, 1897.

With more settled weather business begins to improve, but no large movement of goods to interior points is looked for until the roads become passable. Jobbers are quite confident that a large increase in the volume of goods going out will set in soon, and continue to increase well into March and April. In manufacturing circles there is a confident feeling that when the new season business thoroughly opens there will be more orders than ever before. This is particularly the case with manufacturers of mining machinery, structural material, etc. The tariff question seems to be losing its unfavorable influence with receipt of semi-official information regarding its general character. It is stated that the new bill will be more conservatively drawn than many party leaders thought possible. This of itself is calculated to allay mistrust and create the impression that for the next four years, at least, there will not be any more tinkering with the tariff. Had a radical, high-protection bill been decided on it is quite certain that before two years changes would have to be made, owing to this country's progress in manufactures and other industries.

The prospects of a bountiful crop of wheat and a very large increase in the surplus available for export are having an unfavorable effect on prices for forward shipments of coal, iron, etc., imported from Europe; also for coal shipments from Australia after May next. It is argued that the big crop will draw ships to us which will bring inward cargoes at low freights so as to get outward cargoes at fair to good prices.

In the local money market there is nothing new to report. In the absence of free shipments of products to the East and a continued good demand for New York exchange, the premium for Eastern exchange holds strong. There is very little inquiry for funds, and no improvement in the demand is looked for until after the first week of March. It is quite freely asserted that there will be more activity in the market than for several years, provided nothing occurs to disturb the growing feeling of confidence. The Eastern money markets continue to work on easy lines, with the available surplus in funds not showing any signs of decreasing. London sterlings at New York has firmed up for long bills, owing to a continued growing ease in the London markets. Discounts have dropped there to a rate of 1⅝ per cent per year for call loans. At New York last loans reported were at the rate of 1½ per cent a year for call loans.

New York Silver Prices.

NEW YORK, Feb. 11.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	29¾	64¾
Saturday	29¾	64¾
Monday	29¾	64¾
Tuesday	29¾	64¾
Wednesday	29 11-16	64⅝
Thursday	29 11-16	64⅝

	Copper.	Lead.	Iron.	Tin.
Friday	12 00	3 20	11 00@13 00	13 45
Saturday	12 00	3 20	11 00@13 00	13 45
Monday	12 00	3 25	11 00@13 00	13 45
Tuesday	12 00	3 25	11 00@13 00	13 40
Wednesday	12 00	3 25	11 00@13 00	13 45

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	.22½c Prem
New York Telegraphic Transfer	.25c Prem
London Bankers' 60 days	$4.86¼
London Merchants	$4.85
London Sight Bankers	$4.88¼
Refined Silver, per oz., 1000 fine	64⅝
Mexican Dollars	51½@52

SILVER.—New York mail advices report that for the week ending February 6 1,200,000 ounces of silver bullion were exported. In our market the demand has been more quiet, as it has at the East. The easing off in the price does not cause any surprise, but before the spring months pass better prices are looked for.

Pixley & Abell report shipments of silver to India, China and the Straits as follows for the year to February 1, compared with the corresponding period of last year:

Year.	India.	China.	Straits.	Total.
1897	£253,000	£14,550	.....	£267,550
Corresponding period last year	234,498	12,400	55,200	302,098

It appears that quite large shipments of silver are made direct from Australia to the East without passing through London. Almost all the silver shipped by the Broken Hill Proprietary Company goes to the East, being reshipped at Colombo. Last year about 7,000,000 ounces was thus sent. In addition to this, the shipments from San Francisco to the East direct last year were something like 8,000,000 ounces.

MEXICAN DOLLARS.—The market is quiet but steady. The China demand will commence again after the current week.

ANTIMONY.—Our market is quoted at 7¼@8c in a jobbing way. New York mail advices quote 7¼c for Cookson's, 6½@6¾c for Hallett's and 6¾c for Japanese.

COPPER.—The market is very strong with a further advance looked for. New York advices report a strong upward tendency.

Under date of the 3rd inst., D. Houston & Co., 22 Platt street, New York, say: During the past month a very large business has been done in Lake and Electrolytic, and consumers have shown great interest in the market. The Calumet & Hecla have sold freely at different stages of the market at prices varying from 11½@11⅞ consecutively. Although these transactions have not been in the nature of a "pool" sale, the amount disposed of by this company will aggregate about 10,000,000 pounds. In addition thereto, the Calumet & Hecla has sold largely for export to the continent. The course of the market has fully justified our conviction stated in our last circular that copper would sell at 12 cents before the present issue. Sales have been made repeatedly at 12 cents the past month by different producers, and the quantity placed at these figures has been considerable. That the market rests on a substantial foundation is indisputable, and we incline to the belief that the price of copper is likely to reach a higher level still. Large orders have been placed with manufacturers for copper wire for electrical purposes, against which heavy purchases of copper have been made. The season for activity in electrical improvements is close at hand, and new work in connection with trolley roads, telephone lines and electric lighting is going to create a decided demand for copper to furnish the wire necessary to complete these projected schemes throughout this country and Europe.

The local market is quoted as follows:

Ingot, jobbing	14½@—
Ingot, wholesale	—@13½
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17c

QUICKSILVER.—The market is firm at $37.50 from the syndicate, but there are few outside lots, aggregating about 100 to 200 flasks, that can be had at a slight concession. New York is quoted firm, with outside lots getting scarcer. These sell at 51 to 52 cents, while the syndicate hold at 53 to 54 cents. London is stronger with outside lots cleaning up and the market advancing to Rothschild's recent advance of 5s.

The market is quoted as follows:

Domestic trade, per flask	37 50

For export, quotations are nominal but less than for home.

BORAX.—There is nothing new to report in our market.

The market is quoted as follows:

Refined, in car lots	5
Refined, in sacks	4¾
Powdered, in car lots	4½
Concentrated, "	5

LEAD.—A further advance has taken place with the markets at home and abroad closing strong, with the tendency to still better figures.

Our market is quoted in jobbing lots as follows:

Pig	3 75	@	3 85
Bar	—	@	4 00
Sheet	—	@	5 25
Pipe	—	@	4 50

SHOT.—There is a stronger tone to the market.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 20
Drop, B and larger sizes, " "	1 45
Buck, Balls and Chilled, do, " "	1 45

TIN.—The general situation is unchanged. Pig seems to be strengthening, but plates are very irregular.

We quote as follows:

Pig, per lb	14½c@	—
Plate, I C coke, heavy, per box	$4 05@	—
" " light, "	3 95@	—

IRON—The market is reported essentially unchanged. There is quite a stock of foreign pig here with good shipments on the way. At the East the markets are decidedly mixed with the outlook rather uncertain. A leading New York exchange reporting on the situation says: "A gentleman who has large interests in the iron and steel industry tells us that the wholesale breaking up of pools in that industry will not prove to be permanent. His opinion is that these various associations have been dissolved simply to let the situation adjust itself pending the settlement of tariff questions and other matters. It does not seem likely that any change will be made in the tariff as far as manufacturers of steel are concerned, but it is obvious that the absence of combinations and an apparently free-for-all condition of things is better while the tariff is under consideration than would be the spectacle of half a dozen or a dozen pools scattered all through the trade. As regards the ore question, he believes that before very long another ore pool will be formed, but there is no hurry in forming it as navigation will not open for some weeks.

AMERICAN.

	To Arrive.	Spot.
Sloss	$21 00	$23 50
Thomas	22 00	23 50
Salisbury	30 00	33 00

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—The general situation is practically unchanged. The demand and offerings seem to be fairly equal. The future of the market will depend largely on the wheat crop outturn. Present advices indicate a very large surplus.

We quote as follows:

SPOT FROM YARD—PER TON.

Wellington	$8 00@— —
Greta	6 00@ 6 50
Nanaimo	6 50@ 7 00
Gilman	5 50@ 6 00
Seattle	5 50@ 6 00
Coos Bay	—@ 5 00
Cannel	8 00@— —
Egg, hard	12 00@13 00
Wallsend	—@ 6 50

TO ARRIVE—CARGO LOTS.

Australian	5 50
Liverpool Steam	6 25
Scotch Splint	— —
Cardiff	6 25
Lehigh Lump	9 00
Cumberland	13 00
Egg, hard	10 00
West Hartley	6 50

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied.	Delinq't and Sale.	Secretary.
Alma G M Co, Cal	1	5c	Feb 9	Mar 13..Mar 29	D Gutmann, 320 Sansome
Andes S M Co, Nev	43	10c	Feb 1	Mar 8..Mar 31	Jno W Twiggs, 309 Montgomery
Anita G M Co, Cal	12	5c	Dec 21	Feb 1..Feb 18	L F Reichling, 404 Montgomery
Best & Belcher M Co, Nev	61	25c	Jan 26	Mar 2..Mar 23	M Jaffe, 309 Montgomery
Confidence G M & M Co, Co	1	10c	Jan 19	Feb 27..Mar 20	F Aureguy, 320 Sansome
Eureka Con Drift M Co, Cal	7	5c	Jan 20	Feb 26..Mar 20	D M Kent, 330 Pine
Eureka Con M Co, Nev	14	25c	Jan 18	Feb 23..Mar 15	H P Bush, 134 Market
Gold Hill M Co, Cal	11	25c	Jan 8	Feb 15..Mar 4	C A Grow, Mills Bldg
Gray Eagle M Co, Cal	45	5c	Dec 23	Jan 30..Feb 23	W J Gurnett, 308 Pine
Hartmann Mining Co, Cal	1	5c	Dec 22	Feb 1..Feb 23	G W Peer, 4 Montgomery
Jamison M Co	9	5c	Nov 27	Feb 24..Apr 21	Sam W Cheyney, 120 Sutter
Julia Con M Co, Nev	28	5c	Jan 21	Feb 26..Mar 19	J Stadtfeldt Jr, 309 Montgomery
Marguerite G M & M Co, Cal	5	10c	Jan 14	Feb 25..Apr 8	Chas Peach, 237 Twelfth
Mineral Hill M & S Co, Cal	1	5c	Jan 4	Feb 15..Mar 25	Chas Peach, 210 Sansome
Occidental Con M Co, Nev	26	10c	Feb 10	Mar 16..Apr 6	A K Durbrow, 309 Montgomery
Reward G M Co, Cal	18	2c	Feb 6	Mar 11..Mar 27	S W Backus, Mills Bldg
Thorpe M Co, Cal	5	5c	Jan 13	Feb 23..Mar 15	A F Frey, 44 Phelan Building
Utah Con M Co, Nev	24	5c	Jan 14	Feb 17..Mar 8	A W Havens, 309 Montgomery

LUMBER.—There is nothing new to report.

Redwood, Fluming	17 00	@	— —
Pine	14 00	@	19 00
Spruce	26 00	@	31 00

NAILS.—The market is barely steady, even at the low prices quoted.

Wire, carloads, basis per keg	....
" jobbing, " "	$2 20
Cut, carloads, " "	....
" jobbing, " "	2 00

POWDER.—The demand is fair.

The market is quoted as follows:

Hercules, No. 1*, per pound	11½c
" No. 2, " "	8½c

Mining Share Market.

SAN FRANCISCO, Feb. 11, 1897.

The market has hung around $2.05 for Con. Virginia, while the balance of the list slowly settled. There are enough bull points out of a coming deal to promote much higher prices, but the market acts in such a way as not to create confidence with conservative operators that the points are correct, at least for a near-by move of much moment. At present attention is drawn to Con. Virginia, and the prospects are largely exaggerated, but what they may result in it is hard to say. The writer will venture the opinion that not much if any wider vein will be found than is now being worked, unless work should be pushed further west. When the present showing is developed it is not at all likely but the ore will nearly pay expenses. It is beginning to be discussed who is superintendent of Con. Virginia. Some say Lyman and others say a writer on an afternoon paper. At any rate, the latter is getting considerable credit; so he did when the famous, but ill-fated financially, Jim Rule drift was run. A rumor is current that a combination has been formed to drain the American Flat mines, lying to the south of Overman. It is stated that D. O. Mills and Francis Newland have lent their names to the undertaking. That these mines will be drained is not doubted, for they are rich in minera', but how soon is an open question. The writer will place himself on record as asserting that the Comstock mines will be pumped out and work carried on below the water level. He will also assert that the west lode will be shown up and dividends paid by some of its companies. He will also affirm that the millions of tons of low-grade ore on the Comstock lode will be extracted and milled at a good profit. He will also assert that the Comstock Tunnel will be extended west, and both its north and south lateral tunnels be extended still further, besides which lateral tunnels will be run to develop the Brunswick and one or two more lodes. How soon the above work will be started, and whether as a whole or by sections, the writer will not hazard an opinion; but in the course of time it will all be done, and it will cost big money, which must come out of shareholders.

From the Comstock mines the official letters are as barren of news as a skeleton is of flesh, and they are equally as fascinating for assessment-wracked shareholders to feast their eyes upon. When there will be a change for the better it is hard to say; but with so much active exploiting work going on from one end of the lode to the other, there is apt, but not at all likely until insiders have about all the shares, to be important strikes which would lend new interest to official advices. In Alta they appeared to have dodged the Keystone vein, but have not been so successful in dodging an assessment. In Caledonia they are working on the 1100-foot level. No change of work in Overman. They continue to kill time and spend money. From Seg. Belcher and Belcher the old stereotyped letters come to hand. They do not give any particulars regarding work or how much rich ore they are developing. Crown Point's letters are more satisfactory, so far as concerns the work, but is unsatisfactory so far as concerns ore strikes or prospective strikes. Work is unchanged. In Yellow Jacket and Confidence no change is reported in the work. The latter is still taking out a few tons of ore each week while working to avoid developing the west lode. No work is reported by Challenge. The long joint west crossdrift that is being run by Confidence, Challenge and Con. Imperial is again in hard material. From Alpha and Bullion no change comes to hand. In Potosi they are still fooling around on the upper levels. No work is being done by Chollar. In Hale & Norcross they are working on the 700, 800 and 900 foot levels. Between the two former they have been repairing the shaft, and from the latter they are upraising. From Savage, Gould & Curry and Best & Belcher nothing new has come to hand. The center of attraction is at present the upraise in Con. Virginia from the 1650-foot level and the work on the twenty-sixth floor of the 1750-foot level. It looks very much as if it will result in rainbow chasing. The 1000-foot level bears closer watching than the other two levels, but it will take time yet. In Ophir they are still exploiting the central tunnel and 1000-foot levels. They appear careful not to find anything of much value. The usual prospecting work is being done by Mexican on the 1000-foot level, Union on the 900-foot level and Sierra Nevada in the Layton tunnel.

From the Brunswick lode nothing of an exciting character comes to hand. Occidental has levied another assessment, so as to provide the "sinews of war" to prosecute work on the levels reported last week. Chollar extracted, raised and milled 72 tons of ore last week. Work is being done below the 200-foot level, where they were in a 3-foot vein assaying over $45 a ton. They are working above and below the 300-foot level. On the 400-foot level they are upraising and also driving the south drift ahead. On the 550-foot level they

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are driving ahead on a south drift. The work reported by Savage, Con. Virginia, Best & Belcher and Gould & Curry is practically unchanged.

The following illustrates the changes of the week:

MINES.	Feb. 4.	Feb. 11.
Alpha		$ 19
Alta Consolidated	$ 08	05
Andes	14	.....
Belcher	31	28
Best & Belcher	77	68
Bodie	.....	.....
Bullion	.....	04
Challenge	50	46
Chollar	1 00	91
Confidence	.....	98
Consolidated California and Virginia	2 45	2 10
Consolidated New York	.....	.....
Crown Point	33	.....
Exchequer	.....	.....
Gould & Curry	53	45
Hale & Norcross	.....	1 70
Justice	.....	04
Mexican	47	42
Ophir	1 05	92
Overman	.....	12
Potosi	53	49
Savage	19	16
Sierra Nevada	46	.....
Union	40	.....
Utah	.....	.....
Yellow Jacket	32	29

San Francisco Stock Board Sales.

SAN FRANCISCO, February 11, 1897.

9:30 A. M. SESSION.

100 Belcher	28	200 Gould & Curry	45
300 Benton	17	500 Occidental	08
500 Best & Belcher	68	100 Ophir	91
600 Bullion	04	300 Potosi	49
300 Chollar	91	500 Savage	45
100 Con Cal & Va	2 10		

SECOND SESSION—2:30 P. M.

300 Ophir	92	100 Alpha	19
500 Mexican	42	50 Confidence	98
300 Best & Belcher	69	100 Bullion	04
100	69	300 Overman	12
500 Con Cal & Va	2 10	300 Justice	04
300 Savage	46	300 Alta	05
100 Chollar	91	100 Challenge	46
200 H. & N	1 70	250 Occidental	08
200 Yellow Jacket	29	300 N. G. & C	25

Rainfall and Temperature.

The following data for the week ending 5 A. M., February 10, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week.	Total Seasonal Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date.	Average Seasonal Rainfall to Date.	Maximum Temperature for the Week.	Minimum Temperature for the Week.
Eureka	5.68	32.42	24.73	26.90	62	42
Red Bluff	2.88	18.50	13.83	16.58	60	38
Sacramento	1.77	13.22	14.39	12.43	59	38
San Francisco	2.05	16.71	12.42	15.43	58	45
Fresno	0.90	7.89	4.09	3.94	62	34
San Luis Obispo	0.61	15.03	12.25	....	62	40
Los Angeles	0.40	11.33	5.91	13.28	64	42
San Diego	0.16	7.25	4.44	6.40	64	42
Yuma	....	4.66	0.46	2.21	72	38

Books Received.

Getting Gold: a Gold-Mining Handbook for Practical Men: By J. C. F. Johnson, F.G.S., A.I.M.E. This is a practical book, that will be found of value to practical men engaged in mining as investors, mine owners or prospectors. A great deal of information is given in a small space. To those especially who have not access to larger works on the special subjects, it will be found of use for reference as to the methods of mining in its different branches. Published by Charles Griffin & Co., Limited, London, and J. B. Lippincott Company, Philadelphia. Price, $1.50.

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DELINQUENT SALE NOTICE.

HARTMANN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Chili Gulch District, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 1) levied on the 22nd day of December, 1896, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
C. E. Stephens	2	3,000	150 00
H. Otterson	6	2,500	125 00
J. P. G. Harrell	10	2,000	100 00
C. B. Schonfeld	14	2,000	100 00
C. C. Shepardson	9	3,390	169 50

And in accordance with law, and an order from the Board of Directors, made on the 22nd day of December, 1896, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, Room 46, No. 4 Montgomery street, San Francisco, California, on TUESDAY, the 23d day of February, 1897, at the hour of 5:30 o'clock P. M. of said day, to pay said Delinquent Assessment thereon, together with costs of advertising and expenses of sale.

G. W. PEEK, Secretary.

Office—Room 46, No. 4 Montgomery street, San Francisco, California.

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Address A. H., this office.

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Assessment Notices.

MARGUERITE GOLD MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of January, 1897, an assessment (No. 5) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 8th day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. PEACH, Secretary.

Office—237 12th street, San Francisco, California. Office hours from 4 to 6 o'clock P. M.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 13th day of January, 1897, an assessment (No. 5) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of February, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9), of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of Janugry, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the assessment shall remain unpaid on the 24th day of February, 1897, be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the 26th day of January, 1897, an assessment (No. 61) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on TUESDAY, the 23d day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room No. 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

ANDES SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia City, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of February, 1897, an assessment (No. 48) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 20 and 22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of March, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 31st day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Rooms 20 and 22, Nevada block, 309 Montgomery street, San Francisco, California.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Silver Star Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 10th day of February, 1897, an assessment (No. 26) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of March, 1897, will be delinquent, and advertised for sale at public auction, and, unless payment is made before, will be sold on TUESDAY, the 6th day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED R. BURROW, Secretary.

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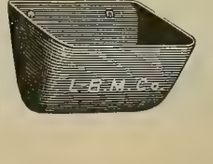
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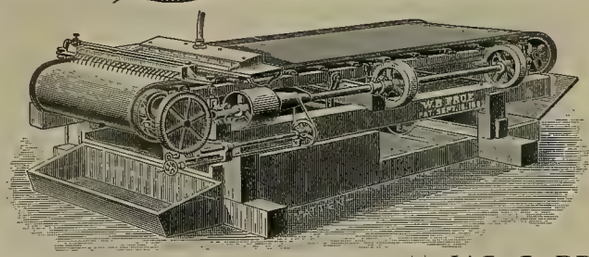
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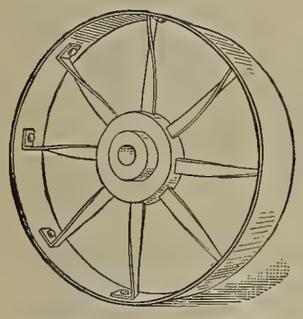
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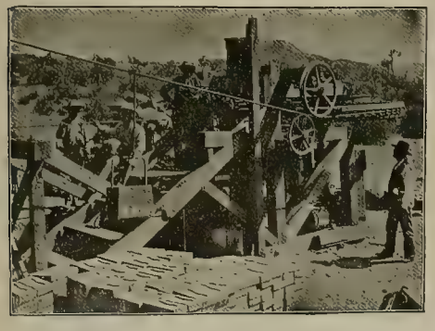
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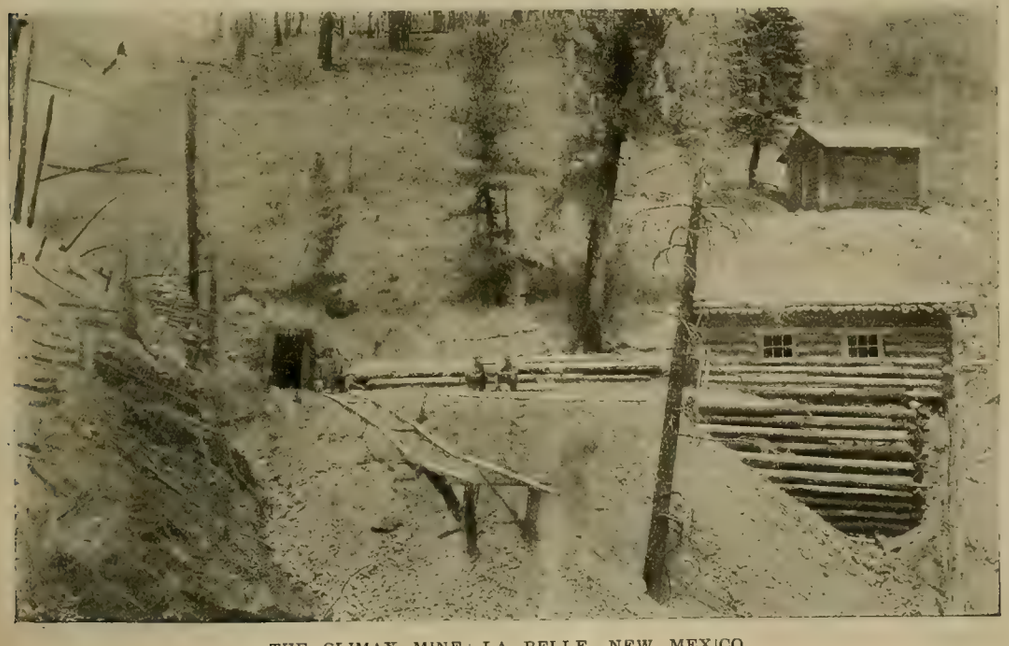


New Mexican Gold Fields.

In the present universal quest for gold, the traditions of ancient mining ground are remembered and every prehistoric point is exploited anew. Our California gold mines go back through fifty years, but we write herewith of a region that yielded gold to the crude efforts of aboriginal miners before the first voyage of Columbus. Reference is made to the gold fields of New Mexico. There is extant a document dated prior to the uprising of 1680, signed by the commandante at Santa Fe, asking the Mexican Vice-royal for an armed force to guard the transportation of a shipment of gold dust valued at over $2,000,000, from a place some miles north of Santa Fe to the Mexican capital. Ancient workings show that centuries before the date mentioned gold was produced from that region in enormous quantities. Many who have given the subject some attention say that the La Belle district, Taos Co., New Mexico, is the oldest mining community in the United States. Ancient evidences of mining indicate principally placer work, but quartz ledges are receiving the most present attention. Abundance of wood and water and a genial climate make work easier for the prospector and miner, and quite recently one of Colorado's leading railways has made that entire country very easy of access. The railroads of Colorado are a big factor in the development of that State. Unlike our California roads, they reach into every little camp, make the most favorable rates as an inducement to business, and superbly advertise the mineral resources of the State. Like the Mormons in Utah, long ago, our California railroad people seem afraid that the world will find out the surpassing mineral wealth of the Golden State and sedulously refrain from mention of mines in their meager publications. The Denver and Gulf Road, of which B. L. Winchell is Gen. Pass. Agt., has a line almost into the La Belle district, and runs from Trinidad in southeastern Colorado to Vasquez, N. M., a few miles north of La Belle. The accompanying views are from the company's most recent brochure, entitled "La Belle Gold Fields, and Trinidad the Gateway."



THE DENMARK MINE, LA BELLE, NEW MEXICO.



THE CLIMAX MINE, LA BELLE, NEW MEXICO.

Since the settlement of the Maxwell land grant difficulty there is an influx of prospectors. The ore is hematitic, changing to sulphides as depth is reached. The breast of a 500-foot tunnel in the Denmark is in $17 ore; the Climax shows a 14-foot vein of $9 ore. The free gold will be treated at La Belle; the concentrates and base ore will be shipped to Trinidad, the natural gateway to that part of New Mexico, a young city where water, coal, iron ore and railroad connection justify its claim to being the metropolis of southern Colorado.

Imports and Exports of Gold and Silver.

The U. S. Bureau of Statistics reports some interesting figures as to the exports and imports of gold and silver for 1895 and 1896. In 1895 there was imported of gold $1,310,448 and exported $15,481,347, while in 1896 the imports exceeded the exports, the former being $2,567,115 and the latter $405,856. As to silver there has been little relative change during the two years under review. The exports in 1895 were $5,159,537 against imports of $883,489. In 1896 the exports were $6,819,545 against imports of $1,279,801.

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J. F. HALLORAN.....General Manager

San Francisco, February 20, 1897.

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An Opening for California Building Stones.

The authorities of the State University of California are taking a step that will be of practical value to those interested in building stones and will do much to show the value of the resources in that direction.

It is entirely probable that for many years to come the authorities of the State University will be concerned with the erection of new buildings. That these new structures will be on a scale befitting the dignity of the institution and of the State of California is assured by the call for competitive plans which has been issued by the Board of Regents to architects the world over. This competition has been rendered immediately possible by the enlightened generosity of Mrs. Phœbe Hearst, who a few months ago gave $15,000 to advance the project and thus secure designs from the most eminent architects of our time.

In the construction of the new buildings, stone will be largely used; and in view of the fact that so little is yet known of the possibilities of the building stones of California, the Department of Geology of the University has been requested, so far as the means at its command will permit, to make a collection of the building stones of the State so that they may be available for examination and choice in determining the stones to be used in construction. Prof. Lawson has begun this work of assembling the building stones of the State at Berkeley and invites the co-operation of quarrymen in making the collection as complete and representative as possible. From quarries or outcrops where quarries are possible, and where the stone is fairly uniform, it is desired to secure two blocks of stone—one a twelve-inch cube dressed differently on different faces to show the qualities of the stone and a four-inch cube similarly dressed for the museum shelves and showcases. In cases where the rock has ornamental qualities and varies in texture and color, as in the marble quarries, several such blocks would be required to represent fairly the stone. In cases where, owing to special structures, the stone appears to better advantage as slabs or columns, these are also desired. These samples properly cut by skilled masons may be sent by freight to the geological museum of the University at Berkeley, where they will be made part of the permanent economic exhibit as soon as the necessary accommodations are provided for the museum. In cases where there are ledges of promising rock, upon which no quarrying has been done, and advice is desired as to the most advantageous opening to be made, it is possible that arrangements may be made whereby Prof. Lawson may visit the ground and advise as to the character of rock, extent, structural features, etc.

Mine Inspectors.

There has been introduced in the California Legislature by Prisk in the Senate and Robinson in the Assembly a bill to provide for the appointment by the Governor of a Mining Inspector, who shall be a practical underground miner, in each Congressional district in the State. The duties of these inspectors are defined as follows:

It shall be the duty of such inspector to examine the underground works of every operated mine, so as to ascertain its safety; to inspect its machinery, modes of ventilation, ladders, roads, supports and modes of exit, and, in case he believes that any of the same is insufficient, or dangerous, to notify the superintendent of such mine, or the owners thereof, and in case such notice remains unheeded by said superintendent or owner, such owner or person employing labor therein shall be liable to his employes and their legal representatives for any accident or injury caused or promoted by the failure to attend to such notice, and the fact that the danger was known to such employes shall be no defense against such liability.

It would seem that, in order to make the work of the inspectors of real value, some provision should be made to force the mine superintendents or owners to remedy the defects when pointed out.

The statute providing that there shall be in each mine two means of egress has been ignored in many cases. In respect to enforcing this law, the proposed mine inspectors should be able to do good work, even under the bill as drawn. It may be said that in a large majority of the mines of the West the superintendents and owners exercise a careful watch for the safety and comfort of their miners. Not only are all reasonable precautions taken against accidents, but the mines are ventilated as well as the circumstances will permit. Self-interest should induce all to do this, but unfortunately there is a small proportion of miner owners for whom stringent laws are necessary, and it is toward such that the proposed bill is directed.

It is probably best that in the proposed bill large powers are not given the inspectors at first. The measure is to an extent an experiment, and a trial will show in what direction there should be changes made by future legislatures.

The Mine Jumper's Paradise.

A correspondent writing from Kern county, California, says that, owning a mining claim the title to which seemed shaky through careless recording, he had it relocated in the name of the new owners January 1, 1896, the notice reading "beginning at this initial monument situated at the shaft of the ——— mine, and well known as the old shaft on the so-called ——— mine and running due east, etc." The exact point of compass was noted for future survey. At the beginning of this year the mine was jumped and taken possession of on the grounds that the assessment work had not been done in 1896—the year of location—and that proper monuments were not put up marking the claim. Those who jumped the property did not claim that the assessment work should have been done under the old title, but under that of the location of January 1, 1896, and, of course, that objection need not be considered here. But as to their other contention that proper monuments had not been put up to mark the boundaries of the claim—is there any one miner familiar with the methods of locating mining claims, or mining lawyer, who can tell what would be the result of a suit brought in the premises?

The MINING AND SCIENTIFIC PRESS is often asked what shall constitute a proper marking of a mining claim on location, and can only say that, to be on the safe side, it is best to put a monument on every corner and two or more on the vein. Until the State Legislature of California shall prescribe what shall constitute a proper marking, there will be confusion. It was hoped that the mining members of the present Legislature would take some steps toward securing the passage of a bill making this provision.

Unless there are adopted good laws on this subject, the troubles caused by jumpers and blackmailers who locate around new discoveries, cutting off rights of way, will increase largely in the near future with the increased activity and interest in mining, and California will become the mine jumper's paradise.

The Age of the Gold-Bearing Gravels of the Sierras.

Owing to the romance connected with the auriferous gravels lying along the western slope of the Sierra Nevada mountains and the importance they have been to the State, the country and to the world through their great yields of gold, there has been devoted to them more attention by geologists than probably their value, from a scientific point of view, would have warranted. More "theories," probably, have been promulgated by prospectors, miners, dabblers in geology and others in reference to these deposits than as to any others in the world. Of these, the old "blue lead" theory—the idea that there was an ancient channel running along the Sierras north and south, across which the present rivers have cut—has been one of the most popular. Geologists have shown that the old streams, in a general way, followed the directions of the present streams. Owing to discovery of supposed vertebrate remains, many have considered the deposits of much more recent formation than they really are.

In a recent article in the *Journal of Geology*, Mr. Waldemar Lindgren of the United States Geological Survey gives an excellent summary of the evidences gained during his extended work on the gold belt, which bear upon the age and history of the auriferous gravels. They have been found not to belong to one continuous period of deposition, but to several, and it has been his object to discriminate those of each period and determine their age. All students on this subject from Whitney down have been obliged to work at a disadvantage in having very few organic remains besides plants to guide them.

He shows that during the later Cretaceous and early Tertiary erosion was actively going on. The earliest and deepest gravels date from the close of the Eocene or the beginning of the Miocene.

During the Miocene broad valleys were excavated, and toward its close, during the deposition of the Ione formation, the great mass of the auriferous gravels were formed.

The extensive eruptions of volcanic material are supposed to close the gravel period. In Mr. Lindgren's classification the Pliocene is considerably contracted, and it is supposed to have closed with the last of the flows of Andesitic lava. The filling period, the Pleistocene, leading down to the present time, was one of active erosion, resulting in the deep canyons dissecting the ancient auriferous channels.

Lindgren differs from Whitney in making the main body of the auriferous growth of Miocene, rather than Pliocene, age; but this comes partly from the fact that he has included within the Miocene deposits which some geologists are more inclined to consider belong in the Pliocene. The determination of that point has, however, a greater technical than practical interest.

This work in the gold belt is certainly beset with great difficulties, and it may be some time before all differences are settled.

According to Lindgren, the history of the Sierra Nevadas has been in general as follows:

1. In early Cretaceous the Sierra block separated by a fault line from the great basin area.
2. Through the Cretaceous and Eocene continued degradation.
3. Slight depression in Eocene or lower Miocene, with the formation of the oldest and deepest auriferous gravels.
4. In later Miocene rhyolitic eruption and continued accumulation of gravels (main gravel period).
5. Andesitic eruptions and elevation of the range.
6. Rapid erosion, followed by basaltic eruptions, cutting deep canyons and glaciation.

A BILL has been introduced in the California Assembly by Mr. Caminetti and favorably reported upon by the Committee on Mines and Mining interests, providing for liens of miners and others upon mining claims. The act deals only with liens against mining claims, and it is so framed as to overcome the difficulties miners now find in making liens lie against many kinds of mining property, such as those held under agricultural patents or under a Mexican grant. The bill also specifies against what kind of work liens may lie. At present Supreme Court rulings preclude the miner from most of the advantages of the lien law.

Concentrates.

THE San Francisco Gold Mining Exchange has closed.

IT is proposed to organize a mining exchange at Baker City, Oregon.

A BANK is to be started in Johannesburg and one in Randsburg, in Kern county, Cal.

A 15-STAMP mill is to be erected on the Rappahannock mine at Sonora, Tuolumne county, Cal.

THE 40-stamp mill put up for the Gwin mine, Calaveras county, Cal., last fall cost $21,000.

THE immediate erection of a matting plant for the sulphide ores of Bingham, Utah, is promised.

AT Waldo, in Southern Oregon, a large vein of copper has been uncovered by hydraulic mining.

ON February 1st the wages of the DeLamar, Idaho, miners were reduced from $3.50 to $3 per day.

DURING the past two weeks over $2,000,000 in gold has been received in New York from San Francisco.

THE amount of timber used in Butte, Montana, copper mines is estimated at over 36,000,000 feet for 1895.

A COMPANY has been incorporated in Salt Lake to work the Russell mica claims in Latah county, Idaho.

ON the Vermilion river, in northwestern Colorado, rich copper and gold deposits have been discovered.

THE Nevada Silica Company shipped from Carson last week a carload of silica to Philadelphia as an experiment.

THE shipments of ore from nine mines at Rossland during the first six weeks of this year amounted to 5085 tons.

JAMES F. WARDNER has obtained a bond on the Monitor at Rossland, B. C., for a Montreal syndicate for about $200,000.

F. AUG. HEINZE, formerly of Montana, who owns smelters in British Columbia, is advocating an export duty on galena ore.

THE Congress mine, Arizona, has 400 men on its pay-roll and there is talk of eighty stamps being added to the 40-stamp mill.

THE prospect of having a railroad built into Deep Creek district, in Utah, this summer has caused considerable renewed activity.

THE exact figures of the output of copper from the Anaconda properties in Montana for '96 are 125,350,693 pounds, against 90,775,294 for 1895.

ALL men have their uses. Senator Stewart of Nevada threatens to "talk the Loud postal bill to death" in the Senate. He can do it.

GEO. D. BURTON is still organizing "electric smelting companies." The most recent is in Portland, Me., "capital stock $1,000,000;" paid up, $60.

ARRANGEMENTS are being made for the erection of a cyanide plant at the Eureka mill on the Carson river, Nevada, mainly for the working Chollar tailings.

UP to February 6th the value of the ore, bullion and matte shipped from the port of Nelson, British Columbia, from the mines of southern Kootenay, was $953,441.

THE promoters of the proposed Twin Lakes Railroad, from Leadville, Colo., to handle the ores of that district, announce that work will be commenced in March.

AT Vancouver, B. C., men are boring for coal; opposite, in North Vancouver, prospectors are at work on gold quartz claims which so far have been but slightly developed.

A PROSPECTOR near Great Falls, Montana, claims to have discovered a soap mine. It consists, he says, of alkali, concentrated, and is strong enough to take the hair off a dog.

A TELEGRAM from Santa Barbara, Cal., states that a gold mine has been found in Smith's canyon, and that a number of prospectors have gone into the hills of the neighborhood.

THE Chainman group of mines in Robinson district, near Ely, Nevada, has been sold to Charles Love and his associates for $125,000. These mines have in the past produced $850,000.

A GROUP of eight claims at Gold Mountain, Piute county, Utah, developed by Miller & Jones, has been sold to W. I. Higgins of Montana for $90,000. A mill will be put up in the summer.

THE Helvetia gold mine, Julian district, San Diego county, Cal., is reported bonded for $40,000 to Denver capitalists. A 1200-foot tunnel is being driven to tap a ledge 700 feet below the surface.

FROM the Peter Wood gravel mine on Magalia ridge, Butte county, Cal., a large section of a tree was taken recently. It was found at a vertical depth of 800 feet and from the face of the tunnel 1100 feet.

IN Kaslo, B. C., steps were recently taken toward forming an association of mine owners of the Nelson, Ainsworth and Slocan districts, and now a movement is on foot to form a similar organization at Rossland.

THE Geyser and Marion mining companies, in the Camp Floyd district, Utah, have settled their differences and joined forces in a new corporation, the Geyser-Marion Mining Company, with a capital stock of $1,500,000.

F. AUG. HEINZE wishes to make arrangements to erect refining works at Trail, B. C., to treat the matte product of his smelter, and to that end is advocating an adjustment of the tariff so as to put on an export duty.

SENATOR MITCHELL of Oregon, who defeated the California mineral land bill last May, has this week discovered that his constituency remember and revenge treachery, even to a sister commonwealth, he having failed of re-election.

NEGOTIATIONS are pending for the sale of the Almo-Cumberland Slocan mill and tramway and the Idaho mine in British Columbia to an English syndicate. The mills have earned $300,000 and the Idaho pays $20,000 a month in dividends.

THE State land department of Montana has received from the Secretary of the Interior a patent to 5459 acres of timber land located on the Missouri river and valued at over $10 per acre. The land belongs to the State Normal School grant.

MANAGER DWIGHT B. HUNTLEY of the De Lamar mine in Idaho reports for January: Tons crushed, 4043; bullion realized, $47,827; ore shipped, $1050; other revenue, $55; total, $48,932; cost and expenses, $42,638; estimated profit, $6294.

AT the John Dix mine, on the Magalia ridge, in Butte county, Cal., in order to trace the channel, a man is trying electric rods, which are supposed to point out the direction the channel follows. Electricity surely is a wonderful thing.

IN the second week in February there were shipped from the Rossland, B. C., mines 1209 tons of ore, of which 720 came from the Le Roi, 250 from the War Eagle, 90 from the Iron Mask, 65 from the Kootenay and Columbia, and 84 from the Josie.

THE reports that have gone abroad of the improvement in mining in the United States and British Columbia during the past year or two, and the depression in the industry in Africa, has caused many of the American miners who went there to return.

THEY are constructing a flume from the Standard Consolidated mill in Bodie, Cal., to the upper cyanide tank, a distance of 1500 feet, to convey tailings, which will be raised by an elevator to about the height of the mill and dumped into the boxes.

A TELEGRAM from Monterey, Mexico, announces the consolidation of the Carbonite, Trinidad and Aztec silver-lead mines and the sale of the controlling interest in the Consolidated Aztec Mining Company stock to a syndicate of local millionaires.

LAST Monday in Denver, Colorado, the Crosby-Ehrich Investment Syndicate made a final payment of $100,000 on the $300,000 they had agreed to pay for 300,000 shares in the Elkton Consolidated Mining Company. They are acting in behalf of French interests.

THE Freshwater mining district, Colorado, is attracting favorable attention. It is located twelve miles from Freshwater station, on the Colorado Midland Railway. Guffie is the name of the postoffice and new town. A mill of thirty-five stamps is about complete.

OVER 900 men are employed in the Slocan, B. C., mines. Americans in the Slocan are alarmed for fear the Legislature will pass a law prohibiting aliens from staking claims in Canada. It is said that the Canadians are inclined to retaliate against the alien labor law recently passed.

THE American consul at Matamoras, Mexico, writes to the State Department of asphalt deposits 300 miles from that city for working which he assisted in obtaining a concession for Americans under a lease for fifty years. A company is now being organized in the United States to commence work.

A BILL has been introduced in the Colorado Legislature which is aimed to prevent the similarity of the names of mining companies. There has grown up an evil in this respect where unscrupulous people mislead the public by giving to worthless properties names similar to those borne by rich mines.

LATELY J. A. Yerrington, at Carson, received several sheets of mica from the Czarina mine, situated in the St. Thomas mining district in Lincoln county, Nevada, from which shipments were made to Manchester, England, and pronounced of good quality. At the mine they are now cutting out sheets a few feet from the surface.

J. K. CLARK, one of the owners of the Mayflower mine in Madison county, Montana, says that a coal discovery on the south side of the Mayflower upsets all geological calculations. The vein was found imbedded in the lime formation and is of a medium fair grade. It is largely impregnated with iron and on assaying went $5 in gold to the ton.

THE Supreme Court of Montana has decided in favor of the shareholders against the directors in the Bannister Mining Company case. The directors had bought an adjoining claim for $45,000, which they transferred to the company for $110,000. The directors have been declared by the court guilty of a conspiracy and the sale was declared void.

THE Gold Creek, Nevada, Townsite Company, with a capital stock of $2,000,000; the Gold Creek, Nevada, Improvement Company, capital stock $100,000, and the Elko, Nevada, Mining Company, with a capital stock of $10,000,000, have incorporated in Colorado. The companies are formed to work the Gold Creek placers and handle the other properties connected.

THE Secretary of the Interior has ruled to the effect that where the book and page of the record of the location certificate has not been given in the published notice for the application of a patent to a mining claim, the application is defective and must be made over again, although the receiver's receipt has been issued. It is unlikely that such a decision will be upheld by the courts.

A CONTRACT has been let for the erection of a 100-ton cyanide and amalgamation mill at Bingham, Utah, on the Highland Boy property. The mill will be upon the plan generally adopted in the treatment of South African ores, first amalgamating and the tailings treated with cyanide. It is to be automatic throughout, the ore passing through the various processes without any handling at all.

IT is amusing to read the claim of Eastern "mining journals" that they are in daily receipt of inquiries from "heavy" investors, asking for advice as to how and where to make purchases of mining property. It is so likely that men with money to buy mining property content themselves solely with supplicating pointers from publishers of "sample copy" "mining journals" in Eastern cities.

THE stocks of copper in the world's market have been decreasing of late in spite of the large output, and with the continued increase of electrical work it is probable that, unless there shall be a large increase in the output, the prices will increase. The total visible supply of copper in the world on February 1 was 32,288 tons, against 34,930 tons the first of January, and 42,128 tons at the first of February, 1896.

ONE Benjamin Brazelle, a very distinguished scientist of St. Louis, Missouri, has discovered a key to all sorts of transmutations with the aid of electricity. He can not only transmute silver into gold, but gold into silver; but that he considers an insignificant part of his discoveries, for he can easily change clay into gold, silver, iron, calcium, aluminum, and some fifteen other metals not known to science.

MINING in the west of England is at a low ebb, and it is said that only one mine is now working at a profit. The mines of lead, antimony, iron, zinc and manganese, which formerly gave employment to some thousands of people, have practically ceased to exist, and the production of copper, once a very large industry, is now quite insignificant. Tin mining is still an important industry, but the quantity produced is dwindling year by year.

THE Congressional Committee now working on the tariff bill has decided to restore the McKinley duty on lead ores. The McKinley rate was 1⅛ cents per pound, the present duty is ¾ cent. It was also decided, instead of having imported lead ores assayed at the port of entry as now, to admit them under bond and have them assayed at the assaying office nearest their destination. Copper, brass, gold and silver were also restored to the rates of the McKinley law, which are 35 per cent ad valorem on copper, 1¼ cents per pound on brass and 30 per cent ad valorem on gold and silver.

ACCORDING to figures furnished by the Witwatersrand Chamber of Mines, Johannesburg, South Africa, the total number of ounces of gold produced by the mines of that district during 1896 was 2,281,374, as compared with 2,277,635 ounces in 1895, 2,024,159 in 1894 and 1,478,473 in 1893. The product for 1896 is 4239 ounces in excess of the preceding year's output and 57,715 ounces more than the Transvaal mines yielded in 1894.

THE gold yield of Ontario, Canada, for 1894 was $32,776; for 1895, $50,281, and for 1896, about $175,000. A number of large mills have been erected and the output is increasing. Of the minerals of economic value mined in Ontario there are salt, petroleum, natural gas, graphite, mica, asbestos, gypsum, apatite, gold, copper, nickel and iron. In 1896 the nickel from the ores and matte of Ontario refined in the United States amounted to 3,697,039 pounds.

THE bill throwing open to use and occupation the reservoir sites of the Western States has passed the House. Bowers explained that with the amendments the bill was favorable to the arid districts and was absolutely necessary to the development of arid lands. Without such legislation acts providing for reservoir sites were useless. There are twenty-three such sites in California, nineteen in New Mexico and as many in Arizona and Nevada.

THE Exploration Company of London, through Henry Bratnober, have purchased from Alvinza Hayward his one-sixth interest in the Mariposa grant, Mariposa county, Cal., for $166,666.66, or at the rate of $1,000,000 for the whole property. Negotiations are now pending for the purchase of other interests. The grant consists of 44,000 acres in Mariposa county. The other owners are the Hobart estate, one-sixth; John W. Mackay, one-sixth, and John P. and Sam Jones, three-sixths.

MR. BEGG has gone on to Ottawa, Canada, to present to the Minister of Railways and Canals his scheme for a railway from Stickeen to Teslin lake and ask for government aid. His plan is to reach the Yukon gold fields by means of a railway from the head of navigation on the Stickeen to Teslin lake, where the headwaters of the Yukon are reached and navigation to Fort Cudahy and other points on the Yukon is available. The length of the railroad would not exceed 125 miles.

THE petroleum industry in Santa Barbara county, Cal., is gradually increasing. Colonel C. F. Crocker recently obtained right of way for a pipe line to Gaviota Landing, through which the new coast road will run, and the product will be piped to that point, a distance of twenty-five miles. English capital is said to be interested in the enterprise. Many prospect wells are being sunk in the Summerfield and other districts. It is stated that one man is pumping a well by hand and gets twelve barrels per day.

AT the late annual meeting of the Daly West Company in Salt Lake the reports showed that during the past year ore of the value of $240,000 had been marketed; that improvements amounting to $128,000 had been erected, and that $114,000 had been put into general operating expenses. There are now in the bins and upon the dumps 12,000 tons of ore, the value of which is estimated at $150,000. The policy of the management has been to take out only such ore as was necessary in the prosecution of development work. Practically no stoping has yet been done.

AT a meeting of the Executive Committee of the California Miners' Association last Tuesday, in this city, called to consider the Debris Commission bills before the Legislature, there were present by request Senators Voorhies, Chapman, Prisk and Shine and Assemblymen Power, Soward and Montana. After considerable discussion, a resolution was adopted recommending that the commissioner's term of office be fixed at four years and his pay at $10 a day while engaged. The question of salary was practically the only one at issue between the Senate and Assembly, the terms of the bill otherwise having been agreed upon.

IN the West Kootenay country, in British Columbia, the mineral lands are open to location by any person having a free miner's license, which costs $5 per year, but only one claim 1500 feet square can be staked off on a vein or ore deposit by one person. No vein or ore can be mined beyond the boundaries of such claim. In other words, these locations have no extra-lateral rights—except those taken up before 1892—on which the vein or deposit can be followed down on its dip beyond the side line. Possessory rights are secured by doing $100 worth of work each year, or paying that amount into the treasury of the province. When $500 worth of work has been done, or that amount paid in, the holder can secure full title through a Crown grant.

IN '93 Chauncey Depew was quoted as saying: "There are fifty men in New York who can in twenty-four hours stop every wheel on all railroads, close every door of our manufactories, lock every switch of all telegraph lines, and shut down every coal and iron mine in the United States. They can do so because they control all the money which this country produces." "This," says another prominent New Yorker, "is as true to-day as it was then, except that the number has been reduced to twenty-five." The statement on both sides is probably a huge exaggeration, but it implies the existence of a money power which is a reality, and which has much to do with the too violent ebb and flow of national prosperity. It also illustrates the fact that gold mining is the one form of metal production unaffected by the usual law of competition and business rivalry, thus standing unique among the business industries of the world.

EVEN as smart a man as General Alger of Michigan, just chosen Secretary of War by President-elect McKinley, and who has made several millions in the lumber business, gets cheated when he goes to Tennessee to buy mineral lands. A case in which General Alger appears as plaintiff came up last week at Chattanooga, Tenn., in the United States Circuit Court there. It seems several years ago General Alger bought of one Anderson 25,000 acres of alleged mineral lands in Franklin county, Tenn. The agents who made the sale represented the property which General Alger bought as possessing the richest deposit of coal in the South. To deceive the purchaser, they washed the hillside ledges with black paint, it is claimed, and by this ruse, the plaintiff alleges, he was induced to invest his money in coal veins of great width. The blackened rocks were made to look like coal. One would think it would take something more than black paint to draw $144,000 out of General Alger's pocket, on a supposed investment in rich coal lands in Tennessee. This beats any reported case of "salting" a gold or silver mine.

Outline of the Geology of California with Reference to Its Mineral Deposits.

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by HAROLD W. FAIRBANKS, Ph. D.

For many millions of years the primitive earth was subject to violent disturbances; the crust was broken up and refused, until finally it became sufficiently cooled to permit the water to settle upon it. Then it was that the forces of erosion first began to act, which resulted in the formation of sedimentary beds along the borders of the seas. Ages followed with repeated eruptions of lavas on different portions of the surface; the formation of great mountain ranges; their erosion through the action of the atmosphere and the rain, while through continued sinking or elevation the crust adjusted itself to the cooling interior.

When life originated we do not know, for the earliest fossiliferous rocks which have been discovered contain organisms already highly differentiated, and it is believed that the time which elapsed between the period when life appeared and the beginning of the Cambrian was much greater than that from the Cambrian to the present day. Our imagination cannot conceive of such immense stretches of time, and while it is quite evident that we cannot even approximately measure them, yet we are certain that time has been long.

In studying geology, then, we begin with the Archæan, the oldest rocks with which we are acquainted and underlying the Cambrian. The basal Archæan rocks contain no fossils at present, as it appears that they have been totally destroyed by metamorphism. From these early times down to the present there is a connected series of rocks which have been deposited beneath the sea and contain greater or less numbers of organic remains. These beds do not, however, occur altogether in one region, and as there have been innumerable catastrophic disturbances, how are we to tell which rocks are the older? In some disturbed regions it is even known that the strata have been completely overturned, so that the older lie on the top. In California the problem of the age of the rocks is particularly difficult to solve, and if it were not for the fossil remains buried in the rocks a classification of the strata according to age would in many cases be impossible.

Although the western part of North America has undergone many convulsions since life began, yet there are portions of the Eastern States where there is an almost complete series of strata from the oldest to the youngest, and disturbed comparatively little. As we study this, as well as other areas in different parts of the earth, we find that there is in all places where the record is comparatively complete a regular succession of animal and plant remains. The oldest are the lowest and simplest in structure, while the younger represent gradually higher and higher types down to the present. When once this organic scale has been established with some certainty we are in a position to apply it to disturbed regions where the series of rocks is not complete. In California the strata are most remarkably broken and disturbed, and it is only by comparing the fossils found in them with those from other parts of the earth that we establish their relative ages. This is not always an easy matter, for not only was the progress of life not absolutely uniform in all parts, but the fossils may be in poor condition and few in number.

We have established, then, a scale of life for classifying the sedimentary rocks of the globe, and when we have added to this the fact that similar strata are deposited under similar conditions in lakes or on marginal sea bottoms, we are fairly well equipped for beginning geological investigations.

There are also other criteria for determining the occurrence of various events. If we examine a great cliff in a canyon or on the seashore it appears to be made up of regular layers of different kinds of rock, as for instance, sandstone, shale and limestone. These may be horizontal, or inclined with bends and fractures, but it is known that they were formed originally in a nearly horizontal position beneath the water, and the position which they now occupy is due to mountain-making movements. In undisturbed portions of the earth these parallel layers may constitute beds of many thousands of feet thickness and have required for their formation millions of years. On the western side of the Sacramento valley the upturned Cretaceous strata have the remarkable thickness of 30,000 feet.

Great convulsions have not generally affected the whole earth at one time, so that geologists in arranging a classification of strata cannot use breaks in the strata in one region for determining the position of those in another. The different periods of geological time to which names have been given are thus not always clearly marked off in various parts of the earth. While in California the oil-bearing strata belonging to the Miocene are distinctly marked off from the other formations above and below, rocks of the same age may in another portion of the country blend into those adjoining. I hope by means of these illustrations to have made clear the fact that terms which we are accustomed to see applied to different formations do not imply that they are everywhere marked off by geographical catastrophies. The great breaks are not generally world wide, and life has moved on in comparatively undisturbed conditions in some places, while in others the strata have been violently upheaved or depressed and life in those places destroyed.

The names which have been given to the successive portions of geologic time from the earliest records down to the present are the following: Archæan, Algonkian, Cambrian, Silurian, Devonian, Carboniferous, Triassic, Jurassic, Cretaceous, Eocene, Miocene, Pliocene, Quarternary. Each of these in different portions of the earth is divided into local stages. Nothing is known definitely about the time length of these divisions beyond the fact that they are probably measured by millions of years. One not familiar with geology may ask: What is the advantage of these names, and what real meaning do they convey? As I have said before, the successive groups of rocks to which the names have been given are found in some portions of the world in regular order one above the other, and with a definite series of fossils in them. Take the great coal period called the Carboniferous. It is characterized everywhere by similar fossils and plants—a fact which has been demonstrated at the expense of years of toil on the part of the scientist. If now in examining the rocks in different parts of California, as, for example, in Shasta county or in the main gold belt in the Sierras, we find certain fossils like those of the Carboniferous of the Middle and Eastern States, we know that we have rocks of that age in California and that there is a possibility of finding coal. The coal of the Carboniferous is of good quality, and it would be greatly to our advantage to possess it. Study of these rocks has, however, led to the conviction that nowhere on the Pacific coast does coal of this age occur. Coal beds require peculiar conditions for their formation—low, swampy or partly inundated areas, either inland or formed by partly inclosed lagoons along the ocean. Now, in California the strata of the Carboniferous period are characterized by an abundance of limestone and shale, which were probably formed in the deep quiet waters of the open ocean at some distance from land.

It is rare that all the geological formations occur in any single region, for, in order to have them all present, that region must have been continuously beneath the sea and receiving sediments through all known geologic time. In California many of the main geological periods are separated from each other by great upheavals, while the strata of some are absent. As a result of this they rest upon each other in unconformable position. By this is meant that the lower ones dip at a different angle from the upper and present a more or less uneven surface on which the upper was deposited. This is a very important condition to be observed in working out the geological history of any region, for it is positive evidence that between the periods of deposition of the two series of rocks the country was raised from beneath the sea, perhaps to form a mountain range, and exposed for thousands of years to the action of rain and other disintegrating and erosive influences, until possibly worn down nearly to the sea level again, after which it sank and a new series of sediments formed over it. Our study of the Coast Range shows that with them this has taken place many times.

At the time of each disturbance, when the crust of the earth has been broken, it has happened that enormous bodies of molten rock have been forced up into the rocks or have flowed out over them on the surface. Sometimes these have covered thousands of square miles, modifying the whole appearance of the country. The economic importance which these lava flows may acquire is illustrated well by the enormous area in northeastern California, northern Nevada, Oregon, Idaho and Washington, which is undoubtedly mineral-bearing, but which has been covered several thousand feet deep by the non-mineral-bearing lavas. Instead of mountain ranges with mineral veins, we have a vast plateau or table land of lava.

It is not believed that the interior of the earth is generally molten. It has a very high temperature, but so great is the pressure that it acts as if it were a solid, becoming molten only when the pressure is removed along mountain foldings, when it flows out through the cracks or lines of weakness in the broken strata.

I have given above, in as plain language as possible, some of the meanings which we see implied in geological phenomena, and which the student of nature uses in deciphering the record of the rocks. It will be seen that the science of geology is based upon facts which become very instructive if properly interpreted. All theories in geology are to-day, as far as possible, compared with actual fact, and we can be reasonably certain that the major part of the conclusions reached are reliable, and not mere guess work.

With this preliminary, which seemed necessary to make the subject clear, I will now take up an outline of the geological history of California as far as it is at present known, beginning with the earliest rocks and tracing them down to the present, discussing at the same time the events which led to the formation of the great mineral deposits of different kinds which are scattered up and down the State.

The western border of the American continent has been the scene since the earliest time of violent foldings of the crust and volcanic disturbances, and its geologic history is correspondingly complex and difficult to decipher. A great deal of study has been given to California, but we are still far from possessing a satisfactory knowledge of what has taken place here. The changes in topography, as well as geography, have been so great that, accustomed as we are to think of the hills and valleys as always existing where they are now, I fear that I cannot adequately emphasize what the intensity of the changes has been.

We have a fairly good idea of the great Archæan area in the northeastern United States and Canada, but in the Cordilleran region our knowledge is not yet very definite. A belt of these ancient rocks has been traced northwesterly through the Rocky mountain region, while nearer, they occur in the Grand canyon of the Colorado; but, as far as California is concerned, we cannot yet say anything definite, for they have not been positively recognized here. The Algonkian is generally associated with the Archæan, and, consequently, we know as little concerning it. A part of the California region, at least, was beneath the sea during that period.

The Cambrian, the oldest group of fossil-bearing rocks, has recently been discovered in the Inyo Range, in eastern California. Rocks of the Silurian period have been found in Plumas county, the Devonian in Shasta and Siskiyou counties, while the Carboniferous appears at many points through the whole gold-bearing region of the State. It is evident that much of California was beneath the sea during the long time represented by these periods, for we must remember that where rocks of a certain age occur that region was submerged during their formation, and probably above water where the strata are absent. These strata now appear as limestone, sandstone and slate, or have been changed to their metamorphic forms as marble, quartzite and mica schist. The relative ages of these older beds have been determined by the fossils contained in them—those animals which populated the world so many million years ago, and which have sometimes been so finely preserved that even the most delicate structures and markings are still visible. During the period from the Cambrian to the Carboniferous land probably existed in western Nevada, and, quite possibly, in the Coast ranges of California. Geologists have generally considered the Coast ranges to be of quite recent origin, but there is nevertheless a granitic axis stretching from Point Reyes southeasterly through the Santa Cruz, Gavilan, Santa Lucia and San Jose ranges toward the San Emedio, San Gabriel and San Bernardino ranges, which, I think, is older than the Sierra Nevadas, and may possibly represent the oldest land area of California. It may be asked: What is the reason for supposing the Coast ranges to be so ancient? It is as follows: Through all these mountains there are no rocks carrying fossils older than the Jurassic (a time just antedating the great gold deposits), and it follows that where all the more ancient rocks are absent, we have good reason for believing that the region existed as land above the sea, for then no extensive rock formations could have been made. It is believed that some time after the close of the Carboniferous (Calaveras formation) land still existed through a part of the Sierra Nevada region, as well as in the Coast ranges.

It may be that gold-bearing quartz veins were formed in this ancient mountain region, as pebbles occur in places in a conglomerate at the base of the Mariposa beds. It is thought by Mr. Lindgren that the gold in this conglomerate, which is exposed on the divide between the middle and north forks of the American river, was derived from those ancient veins; but this is not at all certain, and it seems to me that we have no good evidence of gold deposits antedating the formation of the Sierra Nevadas as a great mountain range at the close of the Jurassic.

(*To be Continued.*)

Rapid-Drop Stamps.

The following description of a rapid-drop stamp mill comes through our Colorado agent from Newell & Newell, of Central City, Colo.: "We have a 10-stamp rapid-drop section in our Penn mill, equipped with Bolthoff self-feeders and Gilpin county bumping tables. These stamps weigh 550 pounds and run about sixty-two drops per minute, with a drop 9 inches. Dimensions of mortar: 9 inches at bottom and, say, 10 inches at bottom of screen. Discharge, about 11 inches. The average percentage of amalgamation is about equal, inside and outside. We use a 50-mesh screen—in fact, the same screen as we use on our slow batteries, running side by side with the fast.

In this mill our plates have an inclination of 2½ inches per foot. The ten rapid stamps crush fully as much as the twenty-five slow stamps, all of them running on the same quality of ore. The percentage of values saved on the plates and in concentrates is slightly in favor of the rapid stamps. It is our intention to replace our slow stamps with the others whenever they are worn out.

Will say we have tested them thoroughly on other

ores as well as our own, and are perfectly satisfied that the rapid-drop stamps, so-called (though really a compromise between a rapid drop and a slow drop), have come to stay, even in slow-going old Gilpin.

We have also our Iron City mill, which is a complete, automatic, modern, quick-drop mill—that is, running at a speed of about sixty-two drops a minute and containing twenty-five stamps—equipped with Bolthoff feeders and Gilpin county bumpers. In this mill the stamps weigh 650 pounds and the plates have an inclination of 1¾ inches per foot. We believe two inches would be about the proper thing.

NEWELL & NEWELL.

Central City, Colo., Feb. 5, 1897.

The West Kootenay Mines.

The following are extracts from the report just published by the Bureau of Mines of British Columbia on the Slocan, Nelson and Ainsworth mining districts in West Kootenay and written by William A. Carlyle, the Provincial Mineralogist:

The mining industry of British Columbia, apart from the placer, gold and coal mining, is of very recent inception. Until eight or nine years ago the great extent of the mountainous country south of the Canadian Pacific Railway to the boundary line was a wilderness known to few save the Indians and hunters, or the prospectors for gold diggings, but the finding of silver-copper ore on Toad mountain, and the beginning of work on the silver-lead ore deposits on the east of Kootenay lake, discovered many years ago by men in the Hudson Bay Company's employ, with the subsequent discovery among the mountains near by of other silver ledges, signalized the commencement of mining in Kootenay. But it was not until 1890–91 that these silver veins were beginning to attract mining men to this Province from abroad, and active operations were getting well under way.

Work, nevertheless, on some of the veins was persevered in, and in 1894 nearly $650,000 worth of silver ore was sent out of Kootenay. Then better means of communication were provided, and in 1895 the production of the different kinds of silver ore increased to over $1,000,000, which production has been doubled in 1896.

Meanwhile the gold-bearing pyrrhotite deposits on Trail Creek were being exploited under many vicissitudes, until the shipments of pay ore, in 1894, to the value of $75,000, and of nearly ten times this amount, in 1895, from the large ore bodies of the Le Roi and War Eagle, commanded wide-spread interest by reason of its being gold ore and very profitable.

The production of the Kootenay mines, when compared with that of many of the mining centers in other countries, will not appear so very large to a casual reader, but when all the conditions are understood, that an entirely new country of large territorial extent is being rapidly opened up under difficulties, that the supply of needed capital, until recently, has been meager, and that in reality not a single mine has had time to do sufficient development to put it on a really proper basis for extraction of ore and further exploratory work, this production will then be seen to indicate a most flourishing and hopeful condition of affairs.

As to the future there is now no doubt but that the number of paying mines and the mine output will steadily increase in the districts to be described, but not with that extravagant rate of increase predicted by some—at least not until those conditions exist that will permit the extraction of a much greater tonnage of ore.

There promises to be a steady increase in the amount of the ore extracted and sold, and in the amount of development done, but it is both unwise and hurtful to predict very large and sudden advances in the mineral output, as it must be remembered that a greatly increased output requires also a greatly increased amount of underground work, unless large bodies of very high-grade ore are uncovered. Extravagant prophesies may travel far, and, if the actual results do not approach the amount thus foreto'd, harm unjustly a mine or district, in which the progress has been most favorable and satisfactory, quite equal to the expectations of those best qualified to know.

The Slocan.—The Slocan, according to the number of its shipping mines and the amount and value of the ore sold, now ranks as the most productive mining district in the Province and in point of importance is not surpassed by any other.

In an area of fifteen by twenty-five miles there have been discovered many veins of high-grade silver-lead ore, which are being developed with great vigor and success, and among the mining men is every feeling of confidence and hopefulness. This winter nearly fifty of these properties are shipping high-grade ore that yields very profitable returns, and a large number of other claims are being opened up.

So far but comparatively little imported capital has been expended here, as in the case of nearly every mine now established sufficient money has been realized from ore extracted during development to pay for more extensive workings, new buildings, mills, trails, roads and also dividends, but more or less capital will be required to properly open up many other claims on which the veins exist, but are not so easily accessible as those first discovered. But as most of these veins are found along the steep mountain sides and can be worked by tunnels, and the cost of mining is low, requiring little or no machinery, capital will be necessary mostly when tramways and concentrators are to be built, or, in some cases, for hoisting plants and pumps when tunnel sites may not be available.

Many of these mines are located near the summits of the high precipitous mountains at an elevation of 5500 to 6500 feet above sea level, where erosion has cleared away nearly all debris from the veins; but lower down, also, on the mountain sides and in the valleys, are being found other veins, or those discovered first much higher up, to the highest of which now run good trails or wagon roads, or else wire-rope tramways. The snow that lies deep on these summits during the winter is in no wise detrimental to mining operations, as most work is done after its fall, when the ore can be dragged down the smooth snow trails in rawhides in larger loads and at lower prices than are possible in the summer time, but the tracks of snow-slides must be carefully avoided.

During 1896, 18,215 pounds of ore yielded 2,141,088 ounces of silver and 19,210,666 pounds of lead, or an average of 117.4 ounces of silver per ton and 52.7% lead, which would have a net profit of about $75 per ton, while many carloads were shipped that yielded from 300 to 400 ounces of silver per ton.

The Slocan Star has, of course, the largest chute of high-grade ore yet found in this district, and we are kindly permitted to state that from 11,529 tons of ore and concentrates sold during the last three years 912,600 ounces of silver and 13,482,000 pounds of lead have been paid for by the smelters, and of these amounts 7000 tons yielded 600,000 ounces of silver and 9,000,000 pounds of lead during the past season of 1896.

Many of the veins are small, varying from 2 to 3 inches in width to 20 to 30 inches of solid ore, but the high value of silver at present makes this ore very profitable, together with the low cost of breaking ground. The small Reco-Goodenough vein, the width of which is measured in inches, is probably the richest vein yet mined, as from the smelter returns of about 600 tons the average was 407 ounces of silver per ton and 42% lead. The high percentage of lead makes this ore a very desirable one for the smelters, and the lead contents are usually sufficient to pay the freight and treatment charges and the duty charged on the lead.

At no time in the history of this district have so many mines had high-grade ore exposed, and of such mines can be named among others the Slocan Star, Ruth, Wonderful, Monitor, Idaho, Alamo, Cumberland, Ivanhoe, Queen Bess, Wild Goose, Payne Group, Slocan Boy, Washington, R. E. Lee, Last Chance, Noble Five Group, Reco, Goodenough, Blue Bird, Antoine, Surprise, Rambler, Best, Dardanelles, Northern Belle, Whitewater, Wellington, Charleston, Lucky Jim, London Hill, Reed and Tenderfoot, Fisher Maiden, Thompson Group, Galena Farm, Enterprise, Neepawa, Bondholder, Two Friends, Howard Fraction.

Nelson.—The Silver King silver-copper mine of the Hall Mines Co., Ltd., the Poorman gold (quartz) mine and some small placer workings have yielded all the production credited to this district, but other mines will be added ere long to this list. Since the completion of the smelter at Nelson there has been greatly increased activity at the mine of this company.

The Silver King mine has now shipped 31,000 tons of ore that yielded 800,000 ounces of silver and 2,500,000 pounds of copper, and the development of the property is rapidly being pushed, so as to permit of a greatly increased output, while the smelter is being increased so as to undertake the treatment of all classes of ore as may be bought in the market.

The Poorman gold mine has given up about $100,000 from its quartz ledge, and other properties in this locality that have similar veins are now under bond and will be worked.

The new district known as the Salmon river country, lying south of Nelson to the boundary and traversed by the Nelson & Fort Shepherd Railroad, was not visited, but during the past year many claims were staked off on gold and silver leads on the ridges, between which run the tributaries of this river.

Ainsworth.—The output from Ainsworth for 1896 was much lowered by the cessation early in the year of mining on the Blue Bell, in which, it is reported, the ore has become rather low-grade for present conditions, but in several of the other mines west of the town of Ainsworth considerable progress was made.

Industries says the ore atomic process is now in successful operation in West Australia. The process consists in first crushing the gold-bearing quartz to lumps of a convenient size, which are then, in a closed chamber from which the air is excluded, submitted to the heat of a furnace, to the action of water, and hydrogen gas. The sulphur in the ore is thereby eliminated, being driven off as sulphuretted hydrogen, and any oxide in the ore is reduced to the metallic state. After being thoroughly heated the material is suddenly quenched by the injection of cold water. The operation is repeated several times, until the quartz is so softened as to be easily crumbled into powder by the fingers. The contents are then thrown into tank and the gold separated by washing. It is claimed that in this process there is no loss whatever by "float gold" or by oxidation, but that every particle of gold in the ore is recovered. The amount of fuel consumed in the operation is variously stated, and will no doubt have a considerable bearing upon the comparative economy of the new process.

How to Thaw Powder.

Harry A. Lee, late Commissioner of Mines of Colorado, writes to the Denver *Republican* as follows on the dangers of thawing dynamite:

The records of the bureau from December 1, 1896, to date show eleven men killed and eleven men seriously crippled, making a total of twenty-two casualties from powder explosions in two months. The causes of these accidents are picking out missed shots, the use of iron or steel tamping bars, and the warming or thawing of frozen powder.

At this season of year explosions are caused by thawing powder in front of a fire or blacksmith forge, on boiler walls and previously heated hot sand, by dipping in hot water, thawing in can heated by by candles or by holding in flame of candle. Few nitro-powder consumers seem to be aware that quick thawing or the application of dry heat of high temperature is the cause of explosions.

Of the twenty-two noticed, all of the men killed or injured were old miners and were pursuing customs which they had followed for periods varying from five to twenty-five years without fatal results.

Where mining plants have steam power the expense of providing a water jacket powder warmer is trivial. For smaller operators there are now several portable powder warmers in the market which can be procured at a cost from $2.50 to $5 each.

The warmer, as a whole, is a cylinder, 10 or more inches in diameter and about 20 inches high, with a bail attached like a bucket for carrying around. The top part is practically a vessel within a vessel, made water tight. The inner vessel is the receptacle for the powder and is securely fastened to the outer vessel at the top and provided with removable cover. The space between the two vessels is filled with water through a spout. The compartment below may be termed the fire box, has a door and proper opening for ventilation and a candle stick to hold two short candles or snuffs. The size here described will hold about eight pounds of powder, but can be procured of any dimension desired.

The miner fills the outer space with water, the inner one with powder, lights the candles and goes to work. The heat from the candles being so small the increase in temperature is slow, but sufficient to heat and thaw the powder within two or three hours after charging. The candles burn out and the water retains heat enough to keep powder in good condition for several hours longer. The owners of these warmers at first used a coal oil or furnace lamp attachment for supplying heat. These attachments were not approved of and it is gratifying to state they have been changed and candles substituted. The reasons urged against the lamp were quick and possibility of long-continued heat through neglect. Nitro-powder and coal oil are comparatively safe when properly cared for, but a dangerous combination when neglected.

The consumer of nitro-powder would do well to give some time and study to the manufacture, use and abuse of explosives. Literature on these questions will be furnished by any of the powder companies upon application.

National Miners' Bureau of Information.

An association has been incorporated under the laws of the State of Colorado called the National Miners' Bureau of Information, with headquarters in Denver. The organization is officered as follows: Thomas B. Everett, general manager; Henry Apple, treasurer; M. C. Jackson, secretary, who, with J. T. Cornforth, W. M. Ingersoll, L. H. Flanders, S. G. Patrick, W. B. Rundle, C. P. Wicks, W. B. Cornforth and C. H. Olmsted, constitute the Board of Control. Spacious quarters have been provided at 1628–34 Lawrence St., Denver.

The plans of the promoters of this bureau contemplate that any miner, prospector or mine owner, having a property, but not having funds with which to develop it, may place with the bureau specimens of his ore, with certificate of assays and data as to location, development, grade of ore, process required, etc., and, by becoming a member of the bureau, he shall have the facilities which it offers members for coming into touch with investors. The interests of the bureau are not to be confined to the promotion of gold and silver mining, but extend to copper, lead, iron, coal, marble, oils and kindred products.

It is anticipated that the membership will include representatives from all the mining sections of the entire West.

Mining Summary.

CALIFORNIA.

Amador.

Record: At the Balliol mine considerable delay has been caused in building the 40-stamp mill by the bad condition of the roads. In the mine at a depth of 60 feet they have a 78-foot vein. Forty feet of this is solid ore carrying from 3 to 5 per cent of sulphurets and yielding well in free gold. The remaining 38 feet of the ledge carries a softer character of quartz, but equally rich in free gold.

At Volcano Superintendent Dillon is putting a crew of men at work on the Excelsior mine.

The Iron Mass mine will soon resume operations.

A new quartz claim is being opened near the Excelsior and Iron Mass mines by the Robinson brothers.

The Live Oak mine is making good progress and will be ready to crush ore the last of this month.

W. Dent and H. King have struck good pay in the Blazing Star mine.

Dispatch: At Volcano W. Lyle is having the water taken out of the Eagle mine, with the intention of opening it up once more.

The Tom & Dick, owned by Atkinson & Taylor, has been bonded to Haskins & Chase, and they are erecting a 10-stamp mill on the property.

The old Soracco or Alta mine, owned by J. Eckhart, has been bonded to a strong company and they are to commence work soon.

Ledger: The shaft at the Oneida is now down 745 feet. The new skips have not yet been hung, but will be in a short time.

Mr. and Mrs. Timms have sold the Plymouth Rock mine to Cyrus E. Brown and James A. Parsons of San Francisco.

The shaft at the Amador Queen is now down about 500 feet. The small hoist now in use on the property is proving inadequate for the work at that depth, and they will take down the Amador Gold Mine hoist and erect it on the Amador Queen property.

Butte.

Register: At Magalia at the Peter Wood mine, of which E. C. Paxton is superintendent, eighteen men are employed and the main tunnel is being extended on the channel.

More men are employed in the Magalia mine than ever before known in its history.

The Ethel, formerly known as the Index or Wiley mine, is being pushed day and night under the management of W. D. Edwards. Three shifts of men are driving the main tunnel ahead.

George B. Mowry, superintendent of the Bader mine, employs eighteen men. The tunnel is now in 1500 feet.

The Oroville mine on the Main West Branch owned by Walsh, Vosberg and the Downer Bros. is turning pay from a channel of gravel they have lately struck.

Ream & Barry have opened a mine on the west branch of Main Butte creek, near the John Dix mine.

Lambert & Co., on west branch of Butte Creek are opening a mine on the Ohio ground.

At the Best mine, on Main Butte creek, seven or eight men are employed under Superintendent Jas. Ream.

Marysville *Democrat*: At the Templar mine near Indiana Ranch for several months a 5-stamp mill has been operated and all of the work has been performed in a manner that satisfied the people who have bonded it that the mine is a good one and will pay dividends. The bond price was $20,000 and it is said the company will enlarge the capacity of the mill to ten stamps.

Calaveras.

Chronicle: The mine on the Gabbert ranch has been sold and the parties are getting ready to sink a shaft 1000 feet. This property is located about two and one-half miles west of the mother lode, in the serpentine formation, which can be traced for a distance of fifteen miles running north and south.

The Sugar Pine mine, on San Domingo ridge, has been bonded to McClay and Tretheway for $6000. A shaft 45 feet deep has been sunk, exposing a 2-foot vein of rich ore.

Toda and Schrack, on their mine, have a tunnel 600 feet in length. At about 500 feet they passed through a vein of quartz 12 feet wide of the same character as the Gwin.

At the Gwin mine work is being prosecuted on the 1200, 1300 and 1400 foot levels running north, which keeps the forty stamps going steadily. When the mine is opened up as the owners intend it to be, it will be easy to keep twice the amount of stamps running.

El Dorado.

(Special Correspondence).—On the Lucinda property, three miles west of Grizzly Flats, development work has progressed favorably. The tunnel is in 120 feet on a 22-inch vein. This is owned by Mrs. Nail.

On Mrs. Hoskins' property, two miles north of Grizzly Flats, the tunnel is in 250 feet and crosscutting on the ledge has been commenced.

Work is progressing favorably on the old Jeffries gravel claim, two miles from Placerville, preparatory to beginning milling operations. The property is under bond to Graeter & Doane.

The reopening of the long-time abandoned Columbus mine, a rich producer in its time, and from shallow workings, located at Cold Springs, five miles west of town, is receiving the consideration of several capitalists.

C. W. D. Hodgkin is operating a gravel property in the neighborhood of Shingle Springs.

Reopening the old Barnes property, generally known as the Greenstone mine, nine miles southwest of here, is actively in progress. This property was never operated to any great depth, yet the Wells-Fargo records of the Shingle Springs office show it to have shipped many thousands of dollars' worth of gold, pure metal that filled many a candle box for the lessees.

The Black Rock hydraulic mine, one mile east of town, is producing an encouraging amount of gold.

Development work in quartz properties under bond is assuming encouraging proportions in all directions from Placerville throughout the county.

Mr. Gebhard is reopening the old Buena Vista mine, a few miles below the Church mine. He is crosscutting the ledge from an 80-foot tunnel.

The new 10-stamp mill erected on the lower end of the abandoned Springfield is working the tailings of the old-time property. It is operated by Williams & Harpending and is known as the Union mine.

Placerville, Feb. 15th, '97.

Nugget: The Jasper Mining Company, Webber Creek district, are developing their properties, the Mammoth, the Gray Eagle and the Independence. At the Mammoth they are driving the tunnel along the ledge taking out milling ore. They now have over 400 tons on their dump.

At the Larkin mine they are still crosscutting for the east ledge from the 100-foot level.

At the Griffith Consolidated they are sinking their shaft and drifting on the 150-foot level and are taking out very high-grade ore.

It is reported that a very rich body of ore has been encountered in the Taylor or Idlewild mine on the 600-foot level.

At the Grand Victory they are drifting from the 300-foot level across the vein and are in good ore.

Kern.

Times: The Winnie and Yucca Tree mines, in the Stringer district, have been sold by Cohen & O'Brien to O. H. Savage of San Jose for $7500.

Mariposa.

Gazette: A company of mining men from Chicago have the bond on the Yellowstone mine and are doing good work under the management of G. Seymour. The main shaft is down now about 420 feet. It is the intention of the company to take the present hoisting works and erect them over the new shaft and put up a new hoisting works over the old shaft. About fifteen men are at work.

R. H. Rodman of San Jose has made arrangements for the purchase of the San Leandro and Esperanzo mines on Bear creek, from the Valenzuela Bros. Mr. Rodman intends erecting a 5-stamp mill as soon as he can get the machinery on the ground.

Nevada.

Herald: On the Ellison mine they are sinking an incline shaft, of two compartments, which has now reached a depth where machinery is necessary. A hoisting rig is being put up. The Ellison adjoins the Odin on the north, and the incline is being run into the ridge to tap the lower end of the gravel channel, on which the Delaware, Harmony and other mines are located.

Transcript: The Washington mine has been worked to a depth of 400 feet, and has three shoots of ore. The longest ore shoot is 380 feet in length on the 400 level.

Hayes Bros. have been obliged to put in a pump in their gravel mine, the recent rains having raised the water.

Herald: At Washington work is about to be commenced on the Gambrinus by Dana Harmon, of the California mine. A contract has been let to extend a tunnel from the California work.

A few men are still engaged at the Spanish, though the mill has been shut down for the winter.

The Eagle Bird, Yuba, Blue Bell and German mines are lying idle though from appearances it is expected that work will be resumed at the Eagle Bird and German mines in the spring.

Plumas.

National-Bulletin: It is the intention of Superintendent J. F. Cummings in the spring to let contracts to do a great deal of tunnel and other work about his mine, which is one of the most extensive and promising in northern Plumas.

Chicago capitalists have a development bond on the Morning Star mine, owned by E. C. Robinson and others of Oakland. J. C. Frick, representing the Chicago men, is now superintending the work of sinking the shaft 200 feet deeper. He has several men employed at this work and will soon be running three shifts.

It is reported that the owners of the Frazier mine, Oakland men, will erect a 10-stamp mill early next summer and prosecute work vigorously.

The Palo Alto mine is expected to resume work early the approaching season.

In a mine near Merrimack, Oakland men last fall and this winter ran about 600 feet of tunnel. They expect to build a mill in the spring.

San Diego.

Sentinel: S. A. McDowell will start in soon taking rock out of the Hubbard mine of Banner.

The Washington mine has been leased to Grigsby, Plant and Hewitt Bros. for two years.

F. E. Allbright, owner of the Alexandra mine, Banner, is having considerable development work done.

The Alpha mine of Banner is being worked by the Stanley Bros. and Reeder.

San Bernardino.

The North Star Mining & Milling Company, organized last October to work the North Star, Gypsy, Gypsy Maid, Bobtail and Broncho Jim mines in the Virginia Dale district, has received a report from an expert employed lately, showing that the company had one shaft down 130 feet with 125-foot drift, with 17,000 tons of ore in sight, valued at $140,000, and it has been decided to push the work by sinking the shaft from 500 to 700 feet deeper and develop the mines without milling any ore at present.

Shasta.

Free Press: The Mariana Mariscano Mining Company, in the old Bell mine at Sunny Hill, has the long tunnel in about 650 feet. It is estimated that the first ledge will be struck at 800 feet, but the work will be continued until the main ledge is reached, which it is estimated will require a tunnel 1150 feet in length.

On the McCloud river rich placer diggings have recently been discovered eight miles above Baird. The Campbell brothers and Pegg & Pipher have located ground which pays in coarse gold.

Sierra.

Enterprise: A number of men went to work last week at the Craycroft and Eureka mines, there being a sufficient head of water to begin operations.

Siskiyou.

Journal: The Eastlick Brothers and Wright & Fletcher hydraulic mines at Oro Fino have been started up again with a good supply of water for the giants.

H. H. Hunter will pump out his claim on Greenhorn, at Calkin's place, and will soon be ready to commence hoisting pay gravel from bedrock again.

Charles Howell, who has a placer claim on Spring gulch, Yreka Flats, near Yreka, picked up a nugget worth $15 last week.

Siskiyou *News*: Hegler & Aldrich have been taking out quartz since the last crushing, and it is looking better and the ledge is getting wider.

C. Blenbaum is working on the extension of the Hegler ledge. They have a good prospect and are running a tunnel on it to tap it lower down.

Bull Bros. & Co. are piping in their claim on Humbug. They get a splendid prospect in the raise.

Smith & Coyle of Hornbrook have been prospecting below the railroad bunk house and have found a rich streak of gravel. They panned out one day $47, and think there is a back channel and intend to run a tunnel in on it.

Reporter: The hydraulic mines all over Siskiyou are starting up, and will be kept in operation from now until next summer. In the Salmon river country and along the Klamath some large plants have been put in during the past few years, which will largely increase the output of gold in this county.

Tuolumne.

Mother Lode Magnet: At the Alameda a new hoist is being built, an air compressor has just been put in working order, and development work is being rushed as fast as supplies will permit.

The Shawmut mine at Jacksonville is working twenty-five men. The company expect to have the mill completed in about a month.

A boiler is being placed on the Modoc mine, near the Buchanan. With the roads in condition to transport machinery and supplies, a force of men will be put to work on the mine.

A rich strike was made in shaft No. 3 of the Santa Ysabel group last week.

Another rich strike has been made on the Fleming vein near Campo Seco.

Shorey and Stover are putting a hydraulic plant on their mines near Horse Shoe Bend, which have been bonded from J. B. Doyle.

Independent: L. A. Engelke has bonded his mining property at American Camp to San Francisco parties.

The Black Oak mine has not been sold, and its owners say it will not be.

The Mullen mine near Tuttletown will shortly be reopened by John Doyle and associates.

The Rappahannock still continues to sink, the quality of the ore encouraging such a course.

Mr. Linehan of San Francisco is opening up his mine on the mother lode near Mormon creek.

The Miller and Holmes mine has found the lost Knox and Boyle vein. It was crosscut on the 600-foot level. The new 20-stamp mill is well under way.

The Golden Rule is now drifting from the 500 level and expects to cut the east ledge within a few feet. This mine is now equipped with electric lights.

The Jerrymander mine has struck a good vein of ore.

Union-Democrat: A 60 H. P. gasolene engine has arrived at the Rawhide to be used to operate the Cornish pump recently put in.

At the 600 level of the Knox & Boyle of the Santa Ysabel group very rich ore has been encountered. The ore body is large, as is usual in the mother lode properties.

On the Gerrymander it is expected to tap the main vein soon and then the erection of a 20-stamp mill be considered. The mine is parallel to the Golden Gate on the west.

At the Mammoth the big strike recently made in the mine still holds out. The pay streak takes in 6 feet of vein matter. Work is being prosecuted on the 700 level.

NEVADA.

Silver State: At the Montauk mines at Bartlett creek, which were purchased from L. Vary last fall by the Columbia Mining Company, C. A. Kinney, the superintendent, has had a force of men at work prospecting and developing them since last fall. The Derby mill was leased and started up a few weeks ago. The concentrates average about $380 per ton, while the ore works about $20 per ton on the plates. Mr. Kinney also contemplates the erection of a cyanide plant, which will work the ore to a higher valuation, as it is not entirely free-milling.

Reno *Gazette*: A strike is reported at Unionville, twety miles south of Mill City, by the Thornton brothers.

Advices received by the *Tribune* from De Lamar indicate that the April Fool Company has been seriously crippled by the recent decision concerning its rights to certain waters and that already over thirty men have been dismissed, the mill closed down and only men enough retained at the mine to enable the owners to work one eight-hour shift. This force is confined to the blocking out of ore, and until arrangements are made for water it is not likely that further attempts will be made to operate the plant. With the mill closed down, the company will, no doubt, resume the shipment of the very high grade ore of which it showed itself capable before the mill was erected, and commence the development of an additional water supply.

Austin *Reveille*: In the north end of Lander county the mill at Dean is running steadily and turning out regular shipments of bullion, and the mine is in good condition.

At Copper canyon six men are employed, and Jorey, Briley and Worst, the owners, have bonded it to Denver people, who are now at work.

At Cottonwood canyon, between Galena and Battle Mountain, is another copper mine which has been bonded to outside parties, and they have four miners at work.

There are many valuable copper mines in Lander county, and it is only a matter of time before they will be owned by capitalists.

OREGON.

Baker City *Democrat*: The Don Juan mine in Robinsonville district, owned by Kelly & Allen, produced thirty-five ounces of gold bullion—the result of a run of five tons of ore through a 3-stamp prospect mill.

At the Bear Creek quartz ledges the Victory and Hidden Treasure, owned by the Lane Bros. of Susanville, have been bonded, one of the considerations being on driving a tunnel and tapping the ledge at a certain depth and that a 20-stamp mill would be erected on the property.

Grant's Pass *Observer*: About $300 in coarse gold was brought in from the Hayes & Jewell mine on Oscar creek this week. The largest chunk weighed $180.

F. H. Mason & Co. of Spokane, Wash., have bonded the Boynton quartz mine on Jump-off-Joe for a short time in which to make a thorough examination.

Rogue River *Courier*: The Horn-Silsby-Tucker mine is piping night and day on the lower Illinois, and the first clean-up has proven it to be one of the richest placer mines in southern Oregon. Some thirty men are at work, and a ditch 3½ miles, just completed, will furnish water the year round.

The Bolt quartz mine, on Galice creek, has been sold to a company of Bavarian capitalists, who will erect a large mill to crush their own and their neighbors' ore.

WASHINGTON.

Spokesman-Review: There will be six shipping mines within ten miles of the mouth of the Methow this year. They are the Hidden Treasure, Highland Light, Monitor, Friday, Hunter and Gray Eagle. Should the Central Washington build fifty miles to the river, the question would be settled.

At Chewelai the Black Hornet is showing a ledge about 40 feet wide. The shaft is down 20 feet and the ore is improving steadily with depth. It is iron and copper pyrites, carrying gold.

At Boundary, Captain Miller, manager of the Columbia and Ontario Mining Company, has purchased for O. W. Chamberlin of Pretoria, Ont., a group of five claims for $8000 cash.

William Berwick has purchased of M. W. Brester of Waneta a quarter interest in the Nevada, a gold and silver property, located in the Lost Creek mining camp, for $1150.

BRITISH COLUMBIA.

(Special Correspondence).—Supt. Veatch of the Cinnabar Mining Co., Savonas, states that the furnaces are practically completed. He estimates an output of 125 tons of half per cent per day, making a net profit of $50.

An assay of decomposed ore from the Orphan Boy, Big Bend country, shows a return of 10 ozs. 3 dwts. of gold valued at $209.70 per ton and 1 oz. 15 dwts. of silver valued at $1.15 per ton. There are 1000 tons of ore on the dump of the Orphan Boy, and a mill recently purchased in San Francisco is on its way to the mine, which is a free-milling proposition.

The Great Northern Railway Company quotes a rate on copper ore from Victoria to St. Louis of $16 per ton and one of $15 per ton from New Westminster to Vancouver.

There is considerable mining activity at Frederic's Arm, where Cobbedick and Forsythe are extensively developing claims.

The Silver Tip mine on Taxada island is to be worked by the Taxada Proprietary Gold Mines, Limited, capitalized in $250,000 in 25-cent shares. The principal offices of the company are in Vancouver, and assays are said to show returns in gold and silver equal to from $16.45 to $44 per ton.

The Athabasca mine at Nelson is creating some stir. The Athabasca Company have eight leads, but are working now only on one. The tunnel on this lead is in 164 feet and the ore averages from 100 assays over $100 a ton free milling. A mill will be on the ground in May, or as soon as the weather permits. Ex-Minister of Finance for Canada, Foster, is at present at the property overseeing development work. GORDMAN.

Vancouver, B. C., Feb. 15th, '97.

The Tennessee and Iowa claims on Quartz creek, one-half mile from the line of the Nelson & Fort Sheppard Railway, have been sold to James McCreath of Nelson for $8000.

The exportation of ore from the Kootenay this year amounts to 3593¼ tons. The smelters have produced 1405 tons of matte. The ore shipments last week from Slocan amounted to 504½ tons. The matte and bullion shipments during the same period amounted to 383 tons, of which the Trail

smelter furnished 301 tons and the Hall Mines 82 tons.

S. Norman & Co., for themselves, and J. D. Farrell have purchased a half interest in the Reciprocity and Lillian mineral claims, adjoining the Payne group, in the Slocan.

The final payment on the Coxey group has been made by C. J. McCraig, who bought the property some time ago from John R. Cook and Elling Johnson. This payment amounts to $21,000.

Colonel Peyton states that all deals for the Le Roi are off. All the workings, including the main shaft, skip shaft, upraises, drifting, tunneling and crosscutting, amounted at the first of the year to fully 3500 feet. It is estimated that 4257 cubic fathoms of ore and waste have been taken from all of the workings, or 33,054 tons hoisted from the mine. One hundred and sixty persons are now upon the Le Roi pay-roll. The company is now hoisting and shipping about 150 tons daily. Of this 50 tons goes to the Trail smelter, and the rest goes to Everett, Tacoma and East Helena. The output is equal to a train load daily.

The ore shipments from Rossland last week were as follows: Le Roi, 715 tons; War Eagle, 350 tons; Iron Mask, 90 tons; Kootenay & Columbia, 75 tons; Josie, 41 tons; Jumbo, 20 tons.

ALASKA.

Mining Record: The following shows the yield of gold in detail for 1896:

Nowell Gold Mining Co., 35 stamps	$ 160,000
Berner's Bay M. & M. Co., 40 stamps	125,000
Alaska-Treadwell G. M. Co., 240 stamps	800,000
Alaska-Mexican G. M. Co., 120 stamps	450,000
Alaska Commercial Co., 40 stamps	500,000
Bald Eagle M. Co., 4 stamps	200,000
Ebner G. M. Co., 10 stamps	35,000
Juneau M. Co., 30 stamps	35,000
Jaulin G. M. Co., 10 stamps	20,000
Alaska-Willoughby G. M. Co., 10 stamps	15,000
Green mine, Norton Sound, 10 stamps	15,000
Total output of quartz mines	$2,355,000
Lituya bay placer mines	15,000
Cook's Inlet placer mines	175,000
Birch Creek district, Yukon mines	1,300,000
Other Yukon districts	800,000
From several small creeks in various parts of the Territory, worked by arrastras	25,000
Total output	$4,670,000
Increase over 1895	$1,670,000

UTAH.

(Special Correspondence).—Gill S. Peyton and Eastern parties have a bond on and are opening a property at the mouth of Little Cottonwood canyon. Two tunnels are being driven to crosscut the vein. Samples of ore show it to be a free milling proposition.

The Taylor & Brunton Ore Sampling Company, having sampling works at Salt Lake City, Utah, and Aspen and Cripple Creek, Col., handled in 1896 76,000 tons of ore at Salt Lake City, 100,000 tons at Aspen, and are now handling at Cripple Creek about 3000 tons per month.

At Robinson, Tintic district, the Sioux-Ajax tunnel, being driven in the locality of the Mammoth, is now in 1600 feet.

The Carissa, a copper property belonging to O'Mera & Co., is shipping about 150 tons of ore per month, which runs from 14 to 40 per cent copper.

The Grand Central people have spent at least $120,000 on their property in Tintic, and have recently made a strike of ore, rich in gold and copper, in a well-marked vein. Their double-compartment shaft has reached a depth of 700 feet.

The Northern Light cyanide mill, in Mercur district, will be in operation by Feb. 20th. The ore from the Northern Light mine is of a highly siliceous nature, is oxydized and carries gold and silver.

The Sunshine cyanide mill is not now running. Within the last few months the ores in the Sunshine mine have become arsenical and considerable clay has been encountered, which mats in the tanks to such an extent as to hinder percolation.

Captain Timothy Egan has been shipping some ore from the Golden Star mine, located on Bald mountain, near Marysvale, which ran $48 in silver and $7.70 in gold per ton. He contemplates putting in a stamp mill, as his ore is free milling.

The Valeo mine, in the Park City district, is attracting considerable interest. A body of ore has been encountered which is rich in copper and gold, with some lead. It contains streaks of high-grade copper running as high as 40 cent. The property belongs to Park City people. WASCOTT.

Salt Lake, Feb. 14th, '97.

Tintic Miner: It is reported that the Swansea Company have decided on the erection of a concentrating plant. While the Swansea has much high-grade ore in sight, which it will pay to ship even under present conditions, they also have immense bodies of low-grade lead ores which are now a dead loss, but with a concentrator would be a most valuable product.

Shipments were as follows last week: From the Bullion-Beck mine, thirty carloads of ore; Bullion-Beck mill, ten carloads of concentrates; Centennial Eureka, fifteen carloads of ore; Eureka Hill mill, eight carloads of concentrates; Humbug, two carleads of ore; Ajax, nine carloads of ore; Sioux mine, nine carloads of one; Sioux mill, two carloads of concentrates; Mammoth mill, twelve carloads of concentrates; North Star, four carloads of ore.

The Picnic shaft is down 260 feet and drift will commence in a few days. There are several streaks of high-grade ore showing in the shaft.

Tribune: Already the stimulating effect of the advance in lead upon the output of Bingham is making itself apparent, and whereas days were recently allowed to go by in which not a pound of ore was sent out, the daily average at present is about seven carloads.

On the Provo river twenty miles from Park City copper ore has been taken out of a cut 20 feet from the surface. The ledge shows a breast of 10 feet at that point. The vein from which the ore was taken is 18 inches. The same rock assayed at Salt Lake yielded 30 per cent copper, a few ounces of silver and 95 cents in gold.

Work has been started in sinking the Daly-West shaft from the 1100 to the 1300-foot level, if the present plans are carried out. At the 1300-foot level a station will be cut and drifts run out to cut the ledge.

At State Line the Gold Hill Mining Company has decided to drive two long tunnels, 500 or 1000 feet, respectively. The contract has been let for the 500-foot tunnel and the contractors commenced work on the 4th inst. The 1000-foot tunnel will be driven from the southeast side of the range, and with each of these tunnels the company expect to crosscut several promising leads, which now crop out on the surface.

Mercur *Mercury*: A good body of ore is now uncovered in the Edna May.

The Daisies are looking better than ever. A drift has been run about 30 feet on the 125-foot level, and the incline has reached a point about 40 feet lower. At both places the ore is widening out.

Men are at work on the Chloride Point and the old workings are being put in good shape.

At the Wonder a depth of 630 feet has been reached, and a station is being made at that point. In a few days the work of sinking will be continued.

Bingham *Bulletin*: Water has been bothering in the 300-foot level of the Winnamuck, but a new pump now has it under control. There is a great show of mineral at the face of the east drift.

Tibble & Hines have made a forty-ton shipment from their Phœnix lease.

The shipments from the old Jordan mine and mill this month promises to be about the same as January's—1700 tons.

Mammoth *Record*: The ore shipments from the camp were reported as follows: Ajax, nine cars; Sioux ore, nine cars; Sioux concentrates, three cars; Mammoth concentrates, 10 cars; Utah ore, three cars.

The Fisher Mining Company is putting up a shaft house on their property near Diamond.

IDAHO.

Review: At Pierce the 5-stamp mill which will be placed upon the Boles group is being loaded on wagons and taken out.

The Gold Reef, owned by Morris & Morrill, has a tunnel 100 feet deep which taps a 20-foot ledge of high-grade concentrating ore, assaying between $30 and $40.

The Idaho mine is being developed with a prospector's stamp mill. A force of men is at work driving a 400-foot tunnel, having reached a depth at this time of about 200 feet.

On Quartz creek, about eight miles from Pierce, Harris & Matthews have driven a tunnel on their property which shows a 25-foot ledge of ore, which carries copper and gold assaying $32.

MONTANA.

Inter-Mountain: The Ajax Mining Company has paid a balance of $68,400 to Connor Bros. and became possessed of the Stray Horse mine, upon which the company took a bond one year ago for $75,000. Besides that amount, the Ajax Company has paid $12,000 to the lessees. The Stray Horse is situated about six miles from Winston.

The St. Paul & Butte Company, which suspended operations some months ago owing to financial troubles, will resume work in a few days on a group of properties near Lloyd's milk ranch. Two sixty-horse boilers and an engine have been secured, and are now being placed in position.

The Agnes, southwest of the Colorado smelter, is being operated by McNerny & Co. An electric hoist and an electric pump have been erected. The lessees expect to find copper ore.

Butte *Miner*: At the Granite Mountain and Bi-Metallic mines in Granite county the immense amount of tailings accumulated in the past nine years at the mines will be worked over and it is thought will be a profitable undertaking for the company. The mines are kept in good condition at a good deal of expense to the stockholders and it is figured that at least enough can be taken from the tailings to pay the general expenses of keeping the mines in condition.

Western Mining World: The annual output of the Bald Butte Mining Company shows a profit during the year of $38,845.22. Development was as follows: Tunnel 578 feet; levels, 489 feet; winzes, crosscuts, etc., 325 feet; total, 1,392 feet. This work cost $12,720.22, an average of $9.14 per foot, including grading and laying track; extracted and put into the bins 24,258 tons of ore, at a cost of $38,843.12, an average of $1.43½ per ton. In addition there are 3,600 tons of broken ore in the mine, and 59,900 tons in the reserve above tunnel No. 1. During the year the mill has dropped its forty stamps for 333.05 days of twenty-four hours each, crushing 23,458 tons, an average of very nearly 70½ tons per day, at a cost of $21,684.12, an average of 92⅔ cents per ton. This average cost is divided as follows: Labor, about 61 cents; wood, about 18⅔ cents; supplies, about 13 cents; total, 92⅔ cents. This ore has yielded bullion to the net value of $124,-030.38, an average of $5.29 per ton. In addition it has yielded 152 tons 857 lbs. of dry concentrates, of the net cash value of $8,811.01, an average of $57.80 per ton of ore. The total net yield per ton of ore milled is therefore $5.67½.

WYOMING.

Notwithstanding heavy snows, the work of prospecting and developing the Grand Encampment mining district is being pushed vigorously. A contract has been let by the owners of the Golden Eagle for a 300-foot tunnel for a water level inlet to the lead. A carload of ore from the Tom Thumb mine runs about $285 to the ton.

There has been received at Laramie thirteen carloads of steel pipe for the Independence mountain placers. It was purchased in San Francisco. When in position the pipe will cover a distance of over two miles. It tapes from 24 inches down to 10, and it will be put in at a point where the fall is 300 feet. The ditch from Big Creek lake will be completed by June 1st, will be fourteen miles long and will carry 5000 miners' inches of water. At the bottom it will be 10 feet wide, and the total cost, when everything is in working order, is placed at $75,000.

SOUTH DAKOTA.

Black Hills *Times*: At Ragged Top the Crown Hill Mining Company will, on the return of S. E. Young from Ohio, inaugurate extensive development work. Ore shipments from this new camp now average from twenty-five to thirty tons per day.

The Ragged Top Gold Mining Company, owners of the Iva group, take out and ship from thirty to fifty tons per week.

All of the ore outside of the Dacey & Kilpatrick Bros.' property, is virtually taken from the surface, none of the workings exceeding 30 feet in depth.

Hattenbach & Co., owners of the Metallic Streak group of claims, situated on the southwest slope of Ragged Top mountain, have opened up a body of oxidized iron ore that assays from $47.20 to $81.79 gold per ton.

The new mining camp on the line of the B. & M. railroad, between Pringle and Loring station, is alive with excitement over recent discoveries.

The Demereau Mining Company, now operating near Pringle, south of Custer City, are pushing work on their development tunnel, now in 200 feet. One vein 30 feet in width has been crosscut, the ore assaying from $16 to $32 gold per ton.

The Striegel group of claims, in South Ruby Basin, consisting of thirteen locations, near Englewood, has been bonded for a short time to eastern parties. A cash payment of $5,000 has been made to the owner, John Striegel.

The Sunnyside management at Hall City are preparing to sink the shaft an additional 100 feet. The vein has steadily improved with depth, and the mill is being run constantly on excellent ore.

A new discovery of siliceous ore has been made south of Englewood, on the line of the B. & M. railroad, samples of which assay from $10 to $180 gold per ton. The formation is lime porphyry or phonolite.

In Yellow Creek Camp the Wasp No. 2 Mining Company have encountered another bonanza in the claim. The shaft in now exposed for over 30 feet in width, and still extends beyond the sides of the workings.

C. A. Stephens & Co. secured a sixty days option and lease on the old Uncle Sam lode, adjoining the Harrison, for $7,000.

The shaft of the National Mining Company on Sugar Loaf hill is now down 250 feet, the last six feet being in a soft chalky material above which 20 feet of blue shale was passed through. It is now believed that another stratum of shale will be found before the ore contact is encountered.

NEW MEXICO.

La Belle *Cressett:* V. G. Hyatt of Pueblo, Colorado, has purchased the Golden Treasure properties in Placer gulch for $10,000.

COLORADO.

LEADVILLE.—(Special Correspondence): Despite the baneful effects of the long-continued labor troubles in Leadville, the district is outputting 1200 tons of ore per day, and there is discernible a rather hopeful feeling and an actual improvement in business. About 1300 men are now employed at the various properties higher up on the hills, though the downtown mines are still closed down. It is learned that perhaps a majority of the men now employed are former members of the local miners' union, who have withdrawn therefrom. I find no hostility among mine owners to labor unions in general, though an actual settlement of the difficulty between the mine owners and the Leadville Miners' Union, as at present controlled, is a thing unlooked for. Unquestionably, the present situation will find a solution only in the time required for the antagonism to wear itself out.

A very important and encouraging matter for Leadville is the action of the Illinois Steel Works in deciding to draw its entire supply of manganese of iron ore from Leadville. It is estimated that 50,000 tons will be required for 1897. This decision is due largely to the efforts of Mr. Geo. W. Cook, Colorado agent of the Illinois Steel Works. The Leadville manganese of iron, after having been thoroughly tested by that company in 1896, was found to be entirely satisfactory. Formerly the Illinois company obtained its supply of this ore from Cuba, Chile, Russia and Japan. The result will be to double the output of iron in Leadville. By reason of a reduction of smelting charges, as low as 3 ounce iron can be handled. Immense bodies of this low-grade ore are in reserve in many of the older properties, which, under the present charges for smelting and the prospective demand, will doubtless be handled.

Among the properties which produce manganese of iron to a marked degree are the Star, Matchless, Chip, Stag, Bison, Denver City, Japan, Jason, Iron-Silver, R. E. Lee and Yankee Doodle. WASCOTT.

Leadville, Col., Feb. 10th, '97.

Denver *Republican*: At Cripple Creek the Ingham on Raven hill has produced 200 tons of ore in the past eighteen days.

Pay ore has been found again in the Ruby on Bull hill by the new workers. After nearly a year of idleness the property was recently secured under bond by T. W. Armstrong, representing a Detroit syndicate.

A Boston company, organized as the Colorado School Land Mining and Leasing Company, is putting up a compressor on Beaver creek above Gillett and will drive a tunnel with air drills into the foothills of Pike's Peak.

The question among Bacon hill workers at the present time is how far they will be allowed to sink on the many new finds before water becomes a serious interference. Dozens of shafts are being pushed down at the present time and no advance measures are being taken toward draining the hill.

Granmer brothers are removing a 10-stamp mill down from Park county and setting it up in Arequa gulch, near the Elkton mine. They will experiment for the best process for handling the tailings and are undecided whether to use cyanide or be content with table concentration.

The report of President R. J. Preston of the Prince Albert Company shows the gross production by lessees since last August has been $59,338.95; 1,045 tons of ore yielding 2,973⅛ ounces of gold and 655¼ ounces of silver. The company received as royalties from the ore $11,324.34. For the ensuing year the new work outlined contemplates the completion of the crosscut from the Gold Dollar tunnel, by which 200 feet of new stoping ground will be opened.

During January the El Paso chlorination mill at Gillett handled 1,407 tons, extracted $40,027, making a daily treatment of forty-five tons of ore of an average value of $28. Work has been commenced on the new plant of 150 tons daily capacity being built by the company at Florence.

W. S. Stratton is developing his two consolidations on Globe and Ironclad hills with a view to finding the right point for sinking a main working shaft to great depth.

ARIZONA.

Republican: At the Black Warrior the ore in sight is estimated at 300,000 tons. President J. A. Flemming has arrived to consult with Superintendent Hill and John Whyte in regard to reduction works. The kind of works that will be erected is yet to be determined, but in all probability both leaching and smelting will be employed.

Prescott *Journal-Miner*: T. G. Massicks, general manager of the Lynx creek hydraulic works, has his boiler in position and will start up his steam shovel and amalgamator soon. He has experimented with this enough to demonstrate its adaptability for extracting the gold from the gravel beds, at a minimum cost and with the use of very little water.

Tucson *Star*: Stiles & Mayhew, of Casa Grande, have sold their recently discovered copper property a few miles south of that town for $60,000, and a smelter will be placed upon the ground at once.

The mines in the neighborhood of Casa Grande are rich, and are attracting a great deal of attention of late. It is understood that the Silver Reef properties have just changed ownership for a consideration of $75,-000.

In the Oro Blanco district Chicago parties have purchased the Con. Arizona mill and two gold properties, and will start up at once. The Oro mill is running on a good grade of gold ore from the Oro mine.

There are sixty men employed extracting ore and freighting it to the Rosemont smelter which it is expected will blow in in a few days.

The Twin Butte mines in the Sierrita district, of Baxter associates, are producing a high grade of copper ore from their 125-foot level, the average being over 30 per cent.

Parties from the Pierce mines say that the output is larger than ever before. Two pulverizing mills have been purchased and are in transit. The capacity of these mills is fifty tons each per day. These pulverizers have become very popular throughout South America and at several points in New Mexico and throughout the Rocky mountain region.

Mojave *Miner*: The Excelsior Mining and Milling Company has acquired title to thirty claims in Indian Secret mining district. The amount paid for the properties is said to have exceeded $2,000,000. R. D. Root engineered the deal and an English syndicate is the purchaser.

Prescott *Courier*: The Lottie mill is running night and day with its ten stamps and four concentrators.

The Annie is running its ten stamps and three six-foot concentrators. A rich strike was made in the bottom of the shaft, at a depth of 200 feet. The ore is sulphuret and and shows free gold.

The Henrietta mill has started up with twenty stamps and eight concentrators. The managers have put on a full force of men, besides letting several leases.

The Jessie mill is running ten stamps and four concentrators night and day. Superintendent Doran is having the other ten stamps fixed up. The greatest output of value from this mill is free gold, although it is a steady shipper of concentrates.

Phœnix *Republican*: The 400-foot level of the Crowned King mine at Big Bug shows better ore than any of the upper levels, thus keeping up its reputation of improving with depth.

A deed has been filed for record from M. H. Angeyine and J. T. Robertson, to the Silver Spring Gold and Silver Mining Company, for the Growler and Silver Spring mining claims, located on the Hassayampa. It is stated that a mill will be erected soon on the property by the company.

At Kingman the Elkhart mine is to have a 100 ton concentrator.

LOWER CALIFORNIA.

Lower Californian: Work has been resumed on the Aurora mine at Alamo. Three weeks ago the pumps were started and the shafts of both the Aurora and Princessa have been drained to the 150-foot level, where they are connected by a drift. Exploration work has already begun on the old works, and a number of drifts will be run. Last week a good body of ore was struck in one of the levels of the old works, and the 5-stamp mill on the property will start up immediately. It is owned by Chicago people.

Scientific Progress.

Refractory Clays.

The most important of the single components of clay are: Alumina, silicic acid, the latter often in chemical combination, sometimes in mechanical admixture, water lime, peroxide of iron, magnesia, and alkali. Clay rich in lime is called marl, while highly ferriferous clays are called loam. These two kinds are not counted among the refractory materials. Clay earth or oxide of alumina melts in the flame of the oxyhydrogen gas blow-pipe, whereby the kind chemically produced appears to be more easily fusible than the natural article. Silica melts at the same temperature as platinum, the chemical product, too, being more easily fusible than the natural silica, as quartz or rock crystal.

When alumina is mixed with silica, or when both materials enter into a chemical combination, or, as it is often noticed with natural clays, when silica is partly combined with clay earth as silicate of alumina, partly admixed mechanically, the chemical law applies to this combination of the two substances, that if two solid bodies enter into a combination the melting point of this combination is lower than the average of the melting temperatures of the two bodies. A mixture of alumina and silicic acid, or the chemical combination of silicate of alumina melts at the same temperature as wrought iron, but the melting temperature rises with the quantity and size of grain of the sand admixed.

When we mix one part (weight) of alumina with one, two, three, or more parts of sand, give to these mixtures the same shape, and heat them to the temperature where cast steel melts, we can observe that the mixtures with higher sand contents begin to slag later. But when the temperature rises above the melting point of cast steel the mixtures richer in sand will cake sooner than those with higher contents of alumina.

Adding to the different mixtures of alumina and sand the substances known as flux, as lime, peroxide of iron, etc., double combinations of alumina and silicic acid, and of silicic acid and the bases of the flux are produced at high temperatures. The melting point of this double combination, however, is again lower than that of the chemically pure silicate of clay. This mixture corresponds, on the whole, to the natural fire clays and these melt, therefore, the easier the more flux they contain, with equal quantities of alumina and silicic acid, or the larger the silica contents with equal quantities of alumina and flux. The contents of alumina appear, therefore, to be determinative for the refractory of the fire clays.

The refractory power and value of clay can be ascertained by means of chemical analysis. The refractory power is dependent upon the proportion of alumina to silicic acid and flux.

THE philosophy of color in light may be presented in this way: It is noted that the light from an electric arc, for instance, when seen near at hand, has a distinctively bluish color, but this same light, when viewed from a distance, appears yellowish, certain of its rays having been absorbed by the water vapor in the air on its passage to the eye; for a similar reason, the sun is now, by some, considered to be a blue star; his light, which would appear intensely white and rich in blue rays especially, if it could be seen beyond our atmosphere, appears yellowish after it has passed through that atmosphere and lost some of its most refrangible constituent rays. The effect of absorption in producing color is seen in the fact that powdered bodies generally appear white, a fact accounted for when it is considered that a powder consists of particles arranged at all angles, so that the light falling upon it meets various surfaces, and is mostly reflected before it has passed below the surface, and thus the white light meeting it is not deprived of some of its constituents by selective absorption, as would be the case if it penetrated the substance and was then reflected. In this way powdered red glass appears white.

EXPERIMENTS show that a light of 1-candle power is plainly visible at 1 mile, and one of 3-candle power at 2 miles. A 10-candle power light was seen with a binocular at 4 miles, one of 29 at 5 miles, though faintly, and one of 33-candle power at the same distance without difficulty. On an exceptionally clear night a white light of 3 2-candle power can be distinguished at 3 miles, one of 5.6 at 4 and one of 12 at 5 miles.

A NEW source of power is utilized in an engine invented by Hermann Pappe of Hamburg, Germany. The most peculiar feature of it is that the material producing the power can be used continuously, without a single renewal. A mixture of ammonia vapor and carbonic acid gas, eventually under access of steam, which, however, is not necessary, is employed, so that, by the expansion of the gas mixture entering under pressure, a cooling of the vapors in the cylinder of the engine is produced. Thus, a salt of ammonia is formed by a smaller or larger part of the gas mixture. This salt is returned to a disintegrating apparatus, working under pressure, in order to be disintegrated by heat into its volatile components, which are again utilized for power purposes.

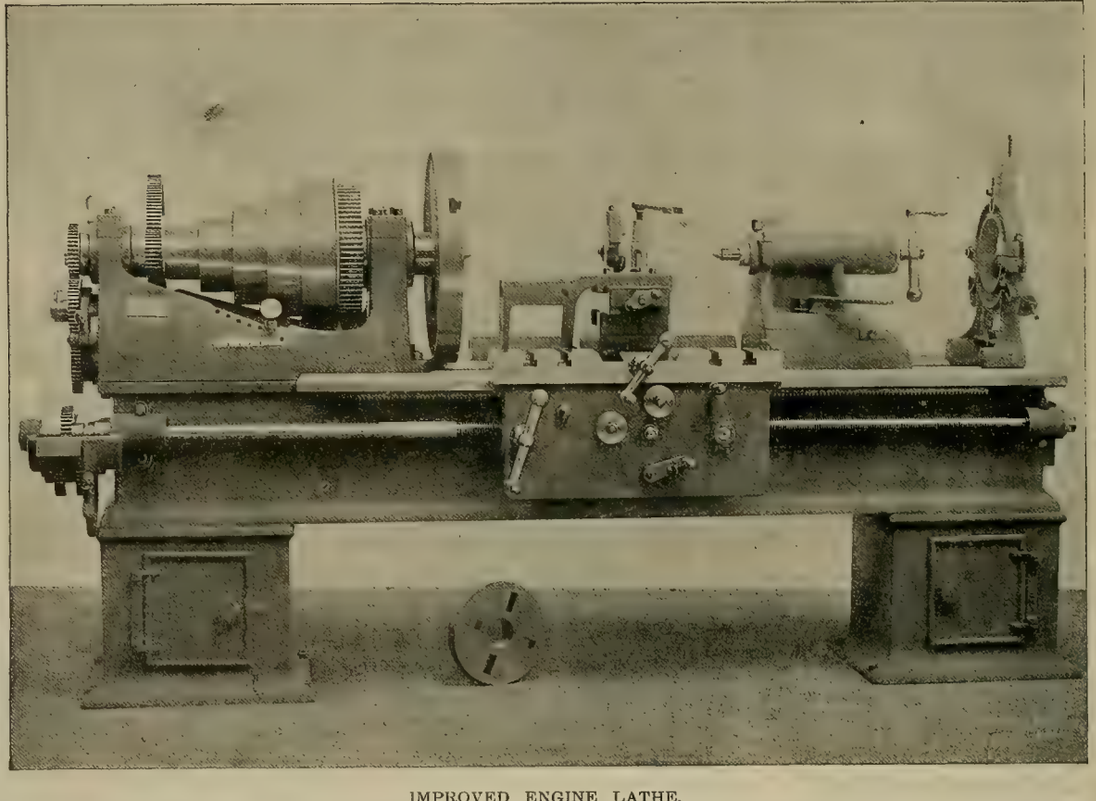
WE now know the mass of the planet Jupiter, certainly to within the hundredth part, and probably to within the thousandth of its total amount. It seems useless for our purpose to express this weight in billions of tons. It will suffice if we compare the weight of Jupiter with the weight of the earth. The result is that we find Jupiter weighs as much as 310 bodies would do if each of them had the same mass as the earth.

AN interesting novelty in passenger car construction is a renovated coach, which has been sheathed with sheet copper of No. 30 gauge, under the direction of Master Car Builder Appleyard of the New York, New Haven and Hartford Railroad Company. The copper does away with painting and varnishing, is on thin wooden sheathing, is handsome, waterproof, and can be repaired in sections.

Mechanical Progress.

Improved Engine Lathe.

The illustration on this page is of a 24-inch improved engine lathe, supplied by the Parke & Lacy Co., 21–23 Fremont street, San Francisco, who furnish upon application description of details of features intended to render them capable of more and quicker work than the old style of lathes. In the lathe portrayed the ratio of back gearing is 13 to 1; cone diameters, $14\frac{1}{2}$ to 5 inches; width of step on cone, $3\frac{1}{4}$ inches; hole through spindle, $1\frac{3}{16}$; front bearing of spindle, 4 inches diameter, $6\frac{1}{2}$ inches long; back bearing of spindle, $3\frac{7}{16}$ inches diameter, $4\frac{1}{2}$ inches long; diameter of tail spindle, $2\frac{7}{16}$ inches; lathe cuts threads, 2 to 28; feeds per inch, 4 to 80; weight of 10-foot lathe, 4000 pounds; speed of countershaft, 150; size of pulleys on countershaft, 14 inches by $4\frac{1}{2}$ inches; 10-foot lathe takes between centers 6 feet; beds made in lengths of 8, 10, 12, 14, 16, 18, 20, 22 feet; swings over carriage $16\frac{1}{2}$ inches.



IMPROVED ENGINE LATHE.

Reduction in Cost of Manufacturing.

A striking illustration of rapid changes in methods, and concomitant great reduction in cost of manufacture, is furnished in the recent history of the evolution of the incandescent electric lamp.

In 1880 I visited Edison's laboratory at Menlo Park, to inspect his new system of incandescent electric lighting. I understood, at that time, that Mr. Edison had succeeded by his methods in reducing the cost of manufacture of the little lamps one-half—*i. e.*, from about $3 to $1.50 each.

To-day, lamps far superior to the earlier forms made in 1880 are sold in large lots at less than 20 cents each! A single factory of the General Electric Company turns out 6,000,000 a year, and the output of all the factories combined is about 20,000,000 lamps per year.

It is interesting, in view of the present low cost of the lamps, to know that the carbon filament is estimated to be, weight for weight, the most valuable substance known.

Filaments for the ordinary 16-candle power lamps are worth $10 a thousand, and it takes 14,000 to weigh one pound.

The filaments in the tiny bulb lamps used for surgical and dental purposes are very much smaller, and are three times more valuable, if estimated by weight, or more than $400,000 per pound.

Formerly it was customary to estimate approximately the cost of a locomotive at $1000 per ton weight. Thus, an engine weighing 40,000 pounds would cost about $20,000. To-day, a first-class locomotive, weighing about 130,000 pounds, costs about $8000, or less than $6\frac{1}{4}$ cents per pound. Labor-saving machinery and "piece-work" systems of pay are largely accountable for these results.—A. E. Outerbridge, Jr., in Journal of the Franklin Inst.

Electrical Progress.

Electrification of Air by Roentgen Rays.

At a meeting of the Royal Society of Edinburgh, Lord Kelvin made a communication on "The Electrification of Air by Roentgen Rays," the outcome, as he explained, of experiments which had occupied his attention, along with that of Dr. Beattie and Dr. de Smolan, since the end of October last. The primary object of their investigations, he said, was to test the effect of Roentgen rays shed upon electrified air—to see whether or not the Roentgen rays had any electrifying effect on air. The following arrangement was made:

A lead cylinder 76 centimetres long and 23 centimetres in diameter was constructed. Both ends were closed with paraffined cardboard, which was transparent to the rays. At the end distant from the electrometer the Roentgen lamp was placed. In the other end two holes were made—one in the middle in which a glass tube of sufficient length was placed to allow the end in the lead cylinder to be put into any desired place in the cylinder. By means of this air was drawn through an electric filter by an air pump. The other hole, a little from the center, contained a second glass tube by which air was drawn through india-rubber tubing from the quadrangle of the University of Glasgow outside the laboratory. In one series of experiments the end of the suction pipe was kept in the center of the lead cylinder, and at various points, 10 centimetres apart, beginning with a point close to the end distant from the Roentgen lamp.

A primary object of their experi-

ments was to test whether air electrified positively or negatively lost its charge by the passage of Roentgen rays through it. They soon obtained an affirmative answer to that question. They found that positively electrified air lost its positive electricity, and in some cases acquired negative electricity under the influence of Roentgen rays, and they were thus led to investigate the effect of Roentgen rays, to begin with, on air unelectrified. In carrying out the experiments, his Lordship added, they found it absolutely necessary not only to surround the electrometer with wire gauze in the usual manner, but they had also to place it on a sheet of lead, and to surround the side facing the Roentgen lamp with lead, too. In some cases it was even necessary to cover up the whole with paper to prevent the electrified air of the room from disturbing the instrument.

Electric Ship Lighting.

When electrical plants were first installed aboard ship, lead-encased cables, run in ordinary molding, were used almost entirely, and in case of iron ships the hull was frequently employed for the return circuit. The latter method soon passed out of use, for it not only increased the fire hazard, but was inefficient mechanically, and also liable to give rise to disturbing influences on the ship's compasses.

Lead-encased conductors in ordinary molding were used on the first two United States men-of-war having electric plants—the Trenton and Omaha—but with unsatisfactory results in each case. In the latter ship, the electrical plant of which was installed by the writer in 1884, the lead-encased port and starboard mains passed through holes bored in live-oak knees (one hole to about each six feet of run), and the writer has a vivid recollection of the difficulties encountered in boring several hundred three-quarter and half-inch holes through about eight inches of gnarled oak very nearly as hard to pierce as some of the tougher metals. It is, perhaps, needless to say that the cost of labor and tools was no small item in the cost of installation.

Lead-encased conductors were finally discarded, except in some special work, as the protection from injury to the insulation and from moisture, which the lead sheath was supposed to give, was found to be illusory. Dents caused short circuiting on the sheath of the conductors, while punctures, permitting the entrance of moisture, led to bad grounds, as well as short circuits.

At the present day what may be called a composite system for the installation of the distributing conductors, is employed. Equal security in all parts of the installation is the object kept in view, and to obtain this several systems are blended together as one. While molding and flexible conduits are used in the saloons and cabins, the conductors in the machinery spaces and holds are run in iron conduits, which are thoroughly insulated on the inside, and special fittings are employed in passing through the decks and bulkheads. Special water-tight switches, cut-outs and fixtures are also used wherever there is exposure to the weather.—Cassier's Magazine.

Practical Information.

The Russian Oil Export in 1896.

The total Russian oil export for 1896 was as follows:

From—	*Residuum and Crude Oil.* Barrels.	*Lubricating Oil.* Barrels.	*Distillate.* Barrels.	*Illuminating Oils.* Barrels.
Batoum.....	70,000	392,700	763,600	4,017,200
Novorossisk....	129,300	333,500	83,100	1,464,200
Total.....	199,300	726,200	846,700	5,481,400

The Baku oil field appears to be inexhaustible. In his December report the Austrian consul at Batoum speaks of two new gushers that came in during the month, one producing from 5000 to 6000 barrels, the other over 10,000 a day. A Belgian company has been organized to develop the Grosni oil field on a more extensive scale. The work on the pipe line between Baku and Mihalovo, or half the distance between Baku and Batoum, will commence as soon as the weather opens. Drilling operations are being pushed actively at Petrovsk, and it is believed that the oil sand will be tapped shortly. A Japanese steamship company will commence in the spring to run a direct line of steamers between Yokohama and Batoum.

In an old pamphlet which was discovered recently in the Astor library in New York are some figures with reference to the cost of a piece of track laid by the Baltimore and Ohio in 1830 and 1831. I. L. Sullivan, evidently a civil engineer, in a report to R. L. Colt, estimates that the track laid with wood sleepers, wood bearers, and plate rail, exclusive of ground and gradation, would cost $4362 per mile; with stone blocks, wood bearers, and plate rail, of which the cost of iron was $1324, the cost would be $5115 per mile; with granite sills in line with plate rail, of which the iron was $2037, the cost would be $6500 per mile, divided as follows: Sills at $11.50 per 100, $3680; bar iron, $1300; broken stone, $640; various items, $880. This engineer speculated on two-ton loads and one-ton cars, and said in his report that the Baltimore and Ohio would be doing a very rash thing if they went beyond this point. He also says: "The locomotive engine now operating successfully on the Baltimore road, made by Mr. Winans to run on a friction carriage, though of moderate power, has a great useful effect." Mr. Winans was apparently the first to patent outside journals and to reduce the resistance from friction from 11¾ to 4 pounds per ton. On July 4, 1828, Charles Carroll of Carrollton, the celebrated signer of the Declaration of Independence, laid the first stone on the Baltimore and Ohio Railroad.—Railway World.

A CONCURRENT RESOLUTION is simply an expression of the members of Congress, and has no effect whatever as a law. It does not go to the President for his approval, and is no more than the advice of a majority of Congress to aid the President in the determination of any public question. In other words, it is no more than a resolution adopted by any mass meeting. A joint resolution, when passed by Congress, must go to the President for his approval or veto. If approved, it becomes a law that must be obeyed by President and people; if vetoed, it may be passed by a two-thirds vote, and thus become a law notwithstanding the objection of the President. In brief, a concurrent resolution is simply an expression of the views of Congress, binding upon no one. A joint resolution has every attribute of a law, and becomes a law when enacted by Congress, with the approval of the President or over his veto.

By the consolidation of the two great iron manufacturing firms of Schneider and Canet, of Paris, the heads of the two foundries visited President Faure recently and assured him that France now has an iron manufacturing plant rivaling the Krupp establishment in Germany.

ADVICES from Valparaiso, Chili, state that the Chamber of Deputies has passed a bill providing for a guarantee of $125,000 to any company which will establish an iron foundry on a large scale in the country.

A SCIENTIST declares that "the elements entering into the cornstalk can be made to produce alcohol, cellulose, paper, matting, smokeless powder and condition powders for cattle."

Cripple Creek—Its History to Date. Illustrated.
Just out, with correct map and costly full page views natural as life. This great book will be sent free prepaid with our big 56-col. family paper 3 months on trial for 25c (stamps or silver); club of 5, $1. Latest mining news. Mention The Press and address *Illustrated Weekly Sentinel*, Denver, Colo.

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W. J. R. COWELL, B.A., F.G.S., Mining Engineer,
Reports on mines, designs and superintends the erection of mining and milling machinery; makes analyses of ores, metals, soils, etc.; arranges for mill tests, and selects suitable processes for the treatment of ores. Correspondence invited. Address W. J. R. COWELL, Victoria, B. C.

British Columbia.
E. S. TOPPING, TRAIL, B. C.,
Has prospects for sale in Trail Creek and the whole of the Columbia basin. Will buy legitimate stock and mines for investors. Will examine mines. Has lots for sale in Trail and Deer Park.

British Columbia Gold Mines.
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Mining Investments.
RECORD BLOCK, - - ROSSLAND, B. C.
Correspondence Solicited.

For Sale at a Bargain.
One new GOLD KING AMALGAMATOR—never used. Apply to Marshutz & Cantrell, N. W. corner Main and Howard streets, San Francisco, California.

The New York Herald in its issue of January 3, 1897, devoted nearly a whole page to a notice of the under-mentioned work which it described as being "A Remarkable Scientific Memorial." It also stated that "Nothing more revolutionary than Dr. Emmens' memorial has been advanced in the name of science since the day when Sir Isaac Newton presented to the Royal Society his doctrine of universal gravitation."

The Argentaurum Papers,
No. 1.
Some Remarks Concerning Gravitation,
By STEPHEN H. EMMENS.

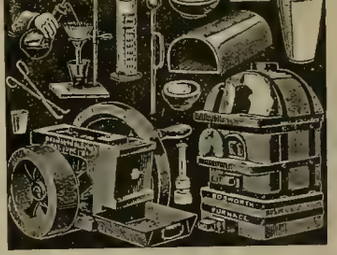
CONTENTS.—Foreword; The Newtonian Doctrine; The Defect of Newton's Proof respecting the Centre of Force of a Spherical Shell; The Newtonian Demonstration respecting the Attraction exerted by Spheres upon External Bodies; An Inquiry as to the Reason of the Defect in the Newtonian Doctrine of Attracting Spheres having remained undiscovered until now; The Newtonian Doctrine of Internal Attractions; The Doctrine of Gravitating Centres as distinguished from Centres of Gravity; The Calculus of Gravitating Centres; The Gravitating Centre of a solid, homogeneous Sphere with relation to external bodies; The case of a Spheroid; The Precession of the Equinoxes; The Density of the Earth; The Internal Attractive Force of a Spherical Shell; The Internal Attractive Force of a Solid Sphere; The status of a Solid Sphere with regard to Internal Pressure; The Centrifugal Theory of Cosmical Bodies; The Variation of Density as regards the Earth's Crust; The Significance of Earthquakes; The Temperature of the Earth; The Source of Terrestrial Heat; The Source of Solar Heat; Saturn and Jupiter; The Volcanic Character and Quiescent Status of the Moon; The Obliquity of the Ecliptic; Elevation, Subsidence and Glacial Epochs; The Cooling and Shrinking of the Earth's Crust; The Arch Theory of the Earth's Crust; The cause of Ocean-beds and Mountains; Terrestrial Magnetism and Electricity; The Presence of Gold in the Ocean; The Verification of the Centrifugal Theory; Universal Gravitation; Epur si muove; The Error of the Dyne; The Variation of Products; The Infinite Concomitant of Newtonian Particles; The self-lifting Power of the Newtonian Particles. How two equally-heavy Newtonian Particles, taken together, weigh less than the sum of their separate Weights; The self contradictory character of the Newtonian Law; The Superior limits of Newtonian Gravitation; The Correlation of Space and Energy; The outline of a system of Universal Physics. Conclusion.—Envoy.

The above-mentioned work is published by the Plain Citizen Publishing Company, 1 Broadway, New York City, N. Y., U. S. A.

Price, cloth bound, $2 00 post-free to any address.

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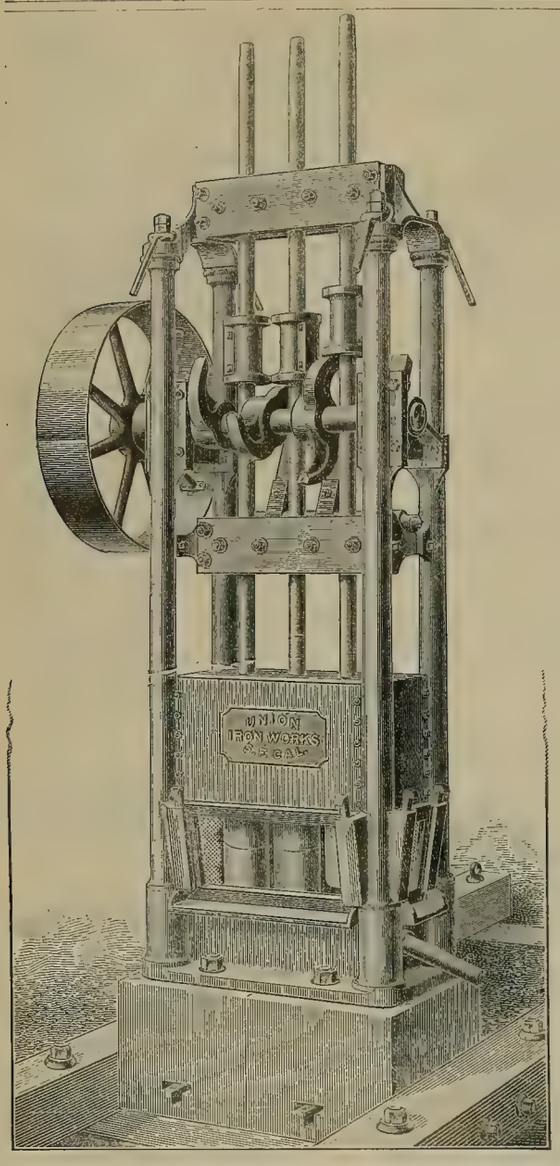
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This

Three-Stamp Iron Frame Battery

WAS MADE BY THE

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The stamps weigh 350 lbs.

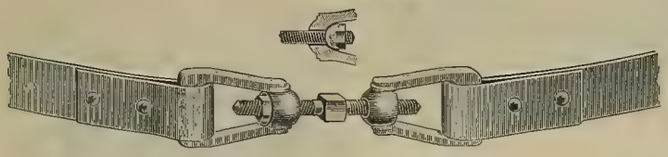
The total weight of the battery is 5000 lbs.

The weight of the heaviest piece is 1300 lbs.

Capacity, five tons per day.

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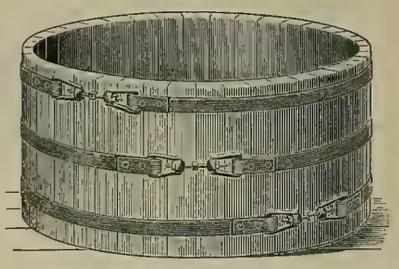
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Spadone's Concentrator Belts. Patented.

The "SPADONE" Curved Edge Concentrator Belt is attracting much attention among mining men, its merits appealing to the millman of practical experience.

Illustration (Fig. 1.) shows a cross-section, and (Fig. 2.) shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

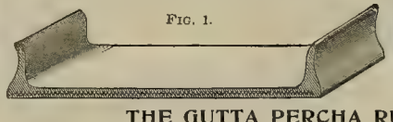


FIG. 1.

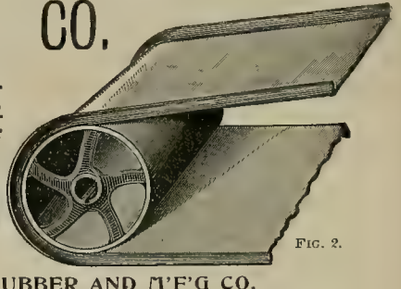


FIG. 2.

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We furnish the machinery and erect at the mines all descriptions of **STAMP MILLS** for the economical treatment of gold and silver ores. **HOISTING AND PUMPING MACHINERY**, operated by Steam, Water, or Electric Motors. **CYANIDE, CHLORINATION AND LEACHING WORKS. COMPLETE CONCENTRATING AND SMELTING PLANTS** for dressing lead ores and smelting for copper and silver. **IMPROVED AIR COMPRESSORS AND DRILLS. WIRE ROPE TRAMWAYS** for transporting ores; **ETC., ETC.**

✦✦✦ **Practical Working Plans and Specifications Provided for All Machinery Furnished or Structures Built By Us.** ✦✦✦

Coast Industrial Notes.

—Flagstaff, Arizona, has voted to issue $65,000 bonds to put in a water system.

—At Los Angeles a movement is on foot to raise $100,000 for the erection of an exposition building.

—Fourteen million dozens of eggs, worth $3,450,000, are produced annually in the State of California.

—To Japan between 20,000,000 and 30,000,000 feet of lumber were exported in 1896, of which 14,000,000 came from the United States, against about 9,000,000 for 1895.

—The Union Mill Co. of Truckee, Cal., will move their mill to Sardine Valley and next summer build a railroad from Sardine Valley to Overton, a distance of nine miles.

—Among the sums for harbor work contracted for by the Secretary of War is $400,000 for Humboldt bay, California. The river appropriations include $160,000 for the Willamette and Yamhill rivers, Oregon.

—The steamer City of Peking, sailing for China and Japan last Saturday, carried a treasure list valued at $668,839, including 361,134 Mexican dollars, $1205 in gold coin, and silver bullion valued at $301,500.

—At Pasadena, Cal., the advocates of a telephone system, to be owned and operated by the city, have been circulating a petition addressed to the Council, and asking it to take steps to forward the scheme.

—The annual meeting of the Manufacturers' and Producers' Association, at which officers will be elected, will be held March 24th. L. R. Mead, M. J. Keller and J. W. Kerr constitute the committee of arrangements.

—The orange shipments from Riverside for this season to Feb. 8th amounted to 260,972 boxes, or 912 carloads of twenty tons each. Last season's total shipments were 2018 carloads. Probably 40 per cent of this year's crop has been shipped.

—It is estimated that there will be planted this year at Chino 6500 acres of beets, and that the factory will have beets from 4500 acres in Orange county and 2000 acres in Ventura county, making a total of 13,000 acres, giving the factory about 130,000 tons of beets to work on the coming season, or more than twice as many as it had last year.

—Mayor Carlson has sent a message to the City Council of San Diego, Cal., concerning the proposed railroad to Yuma. He seeks to secure a franchise whereby he will control a large part of the bay front for railroad purposes. In addition to this, he wants San Diego to put up $480,000 as an interest guarantee on the cost of building a Yuma road.

—American contractors have a contract from the Mexican government for the improvement of the harbor at Mazatlan. About $2,000,000 will be expended in the work. If a deep harbor is secured Mazatlan will become an important port, a concession for the building of a railroad from Durango to that place having recently been granted by the government.

—Last week in the United States Court at Boise, Idaho, an order was made confirming the sale of the Oregon Short Line. Joseph Johnson of the New York Construction Co. has closed a contract for building the 103 miles of road to the Seven Devels mining district. A sub-contract for the first 20 miles has been let, subject to the approval of the New York office, and another 20 miles is to be contracted for at once. The company is contracting for men to work on the grade.

—A Bombay native firm, under whose auspices the Bombay Grain Trading Company has been formed, are said to have ordered about 3600 tons of California corn for delivery about the end of this month. The grain can be laid down in Bombay at 28 rupees per candy, as compared with 56 rupees per candy, the price of Indian wheat in that market. Efforts are being made to promote a taste for corn among the natives, apparently with some success, and a great demand for American corn in India is confidently looked forward to in the near future.

—The Union Iron Works, about March 17th, will launch two war vessels—the Wheeling and the Marietta. This is the first time that two war vessels have been launched the same time on this coast. Citizens of Wheeling, West Virginia, and Marietta, Ohio, will send delegations to participate. These two additions to the United States navy are twin-screw, light-draught composite gunboats. Their contract cost price is $219,000 and $223,000 respectively. Both vessels are of the same dimensions—174 feet long on the load water line, the beam extreme at water line 34 feet, the draught 12 feet. They are 1000 tons displacement, and their horse power is 800, and estimated speed is 12 knots. The coal supply is 250 tons, and the complement of officers, seamen and marines 146. Their armament consists of six 4-inch rapid fire guns, one forward and one aft on the main deck and two on each broadside of the gun deck. There are also four 6 pounders and four 1-pounders, all rapid fire.

Book Notices.

Handbook of British Columbia Mining Laws: This is a second edition of a summary of the "Mineral Act" and the "Placer Act" of British Columbia that will be found to be of interest to all who have to do with the mines of that northwest province. Published by Ernest H. Roome, Vancouver, B. C.; price 25 cents.

Latest Mining Laws of British Columbia, United States and the State of Washington: This pamphlet, compiled by Filley & Ogden of Olympia, Washington, will be found of value to miners of the Northwest, many of whom are interested on both sides of the international boundary line. Published by O. C. White, Olympia, Washington. Price 50 cents.

Commercial Paragraphs.

W. H. RENDELL of Florence, Col., has one of the sub contracts for the construction of the new cyanide plant at that place.

THE Zing Brewing Company of Denver, Col., now controlled by an English syndicate, is preparing to build an entirely new plant, which involves copper and iron work to the value of about $20,000

THE Iron City Manufacturing Company of Pueblo, Col., do all the iron work for the Stearns-Roger Manufacturing Company of Denver. Among the contracts which they now have on hand is the construction of the new cyanide plant at Florence.

THE Risdon Iron Works, Howard and Beale Sts., S. F., have issued a catalogue dealing with the Evans elevator and hydraulic mining machinery that will be found of value to those interested in gravel mining, especially on account of the data, tables, etc., given. Much has been done of late years in the way of developing new methods for working gravels where difficulties as to dump, shortness of water supply and lack of pressure are met with, and many of these are explained in this catalogue.

THE E. P. Allis Co. has received advices of the completion of a complete concentrating plant, furnished for Jorge Basadre, Tacna, Chili, South America, 150 miles distant from a railroad. All the machinery had to be transported by mule back, and no piece weighed over 150 pounds, consequently all the machinery, etc., had to be made in sections not weighing over 150 pounds. The iron beams for the building and all the other parts were also made in these sections. The labor employed in constructing and erecting the buildings and machinery was principally comprised of Bolivian Indians. The plant will soon be in operation.

THE Colliery Engineer Co., Scranton, Pa., proprietors of the International Correspondence Schools, announce that, commencing with the February issue, the name of the journal, *Home Study*, which they publish, will be changed to *Home Study Magazine*, the page will be reduced to magazine size, but the number of pages will be doubled. The articles relating to particular branches of industrial science will be grouped in separate issues. Articles relating to steam engineering will be published in the February and August issues; those on plumbing, heating and ventilation in the March and September issues; those on architecture in the April and October issues; those on civil engineering in the May and November issues; those on electrical engineering in the June and December issues, and those on mechanical engineering in the July and January issues. Each issue will contain other articles, but, as a rule, the general reading portion will consist principally of articles on some particular technical subject. More space will be given to the answers to inquiries department. Inquiries relating to the various trades and professions will be answered in the order in which they are received, without regard for the special edition in which they are published. Each issue will contain a drawing plate, with instructions for drawing it, and an effort will be made to adapt the plate to the subject treated in the issue in which it appears. These plates will be of great assistance to anyone who desires to learn drawing and will be valuable for reference. The subscription price is $1 50 a year, but subscriptions will be accepted at 30 cents for any of the two-number editions.

Recent California Mining Incorporations.

Van Tassel M. and W. Co., San Francisco; capital stock $150,000—$500 subscribed. J. Curtin, J. W. Wright, A. McDonald, E. McMartin, W. R. Smedberg.

Inyo County M. and D. Co., Los Angeles, Cal.; capital stock $200,000—$78.000 subscribed. C. A. Ludden, G. Couch, C. E. White, R. A. Wallace, S. F. Owen, R. J. Tarr, F. B. King, Pomona.

Horseshoe M. Co., San Francisco; capital stock $1,000,000—$2000 subscribed. C. E. Green, A. F. Morrison, San Francisco; J. D. Bradley, J. F. Peck, A. G. Clough, Merced; C. E. A. Foerster, San Mateo.

Almatah G. M. Co., San Francisco; capital stock $100,000—$55,000 subscribed. H. C. Henderson, G. Gall, A. Woodside, T. Frolich, San Francisco; J. C. Jens, Belmont.

Bank of England Con. G. M. Co., San Francisco; capital stock $600,000—$300,000 subscribed. T. Frolich, A. Gall, A. Woodside, San Francisco; J. C. Jens, Belmont; W. J. Woodside, Belfast, Ireland.

Personal.

JNO. L. NEAGLE is president of the Hydro Smelting and Refining Co., Tacoma, Wash.

CHAS. R. WORTS has removed his sampling works from Tucson, Arizona, to Johannesburg, Cal.

CHARLES BUTTERS left San Francisco last Tuesday for London on his way to South Africa.

STATE GEOLOGIST T. A. RICKARD of Colorado has returned to Denver from an eastern Oregon trip.

A. B. MCCAW has returned from New York and is investigating some Calaveras county property.

P. T. FARNSWORTH has been appointed general manager of the Mammoth Mining Company, Utah.

E. C. ENGLEHARDT has accepted the position of superintendent of the Page Reduction Works, now being built at Florence, Colo.

M. E. MACDONALD has resumed the position of superintendent of the Gibbonsville, Idaho, properties of the American Development Co.

THOMAS CURRANS, president of the Silver King Mining Company of Utah, has recently been in California, looking over our gold fields.

G. M. HYAMS, consulting engineer of the Boston & Montana, and identified with the reorganization of the Butte & Boston Company, is in California to inspect the Merced gold mining properties, in which company he is also interested.

Recently Declared Mining Dividends.

Utah, Utah, $2000, payable Feb. 6.

Silver King, Utah, $7500, payable Feb. 8.

Sacramento, Utah, $5000, payable Feb. 25.

New York and Honduras Gold Mining Company, Rosario, $15,000, Feb. 15th.

Quincy Copper Mining Company, Michigan, $400,00 , Feb. 15th.

Bullion-Beck Mining Company, Utah, $1 per share, $100,000; a total to date of $2,067,000.

Mercur Mining Company, Utah, 12½ cents per share, $25,000; total to date, $615,000.

Centennial-Eureka Mining Company, Utah, $1 per share, $30,000; total to date, $1,920,000.

South Swansea, Utah, $7500, payable February 20; a total to date of $22,500.

Standard Con. M. Co., Bodie, Cal., ten cents per share, payable March 23.

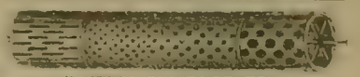
Daly, Utah, $37,500, payable Feb. 22. The total to date is $2,924,000.

FOR SALE---CHANNEL GRAVEL PROPERTY.

One Hundred and Two Acres at Reasonable Figures.

No cement. Permit to hydraulic assured. Expense for impounding debris comparatively small. Cheap water. Reasonable time for prospecting. Will negotiate with principals only, or authorized agents. Cash proposition. Address GRAVEL MINE, P. O. Box 66, Placerville, Cal.

E. E. BURLINGAME'S ASSAY OFFICE AND Chemical Laboratory. Established in Colorado, 1865. Samples by mail or express will receive prompt and careful attention. Gold and silver bullion refined, melted and assayed or purchased. Address 1735 and 1738 Lawrence Street, Denver, Colo.



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SAN FRANCISCO Pioneer Screen Works
JOHN W. QUICK, Prop

Improved Facilities! Finest Work! Lowest Prices!

Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.

—MINING SCREENS A SPECIALTY.—
221 and 223 First Street, San Francisco, Cal.



QUARTZ SCREENS

A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO. 145 and 147 Beale St., S.F.

EDWARD L. HALLAWELL,
115 and 117 Main Street (2nd floor),
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Millwright and Engineer.

Contractor for the erection of Stamp Mills, Roller Mills, Reduction Works, Saw Mills (both circular and band), Aerial Wire Rope and Surface Tramways, etc., etc. Putting in machinery, shafting, etc., of all kinds promptly attended to. Estimates given on plants, complete, including machinery, building material, etc.

ANGELS IRON WORKS,
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Mining Machinery.
ANGELS, CAL.
Write for estimates on complete Milling, Mining and Reduction Plants.

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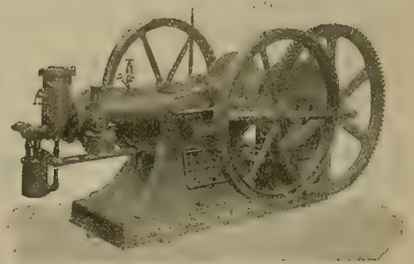
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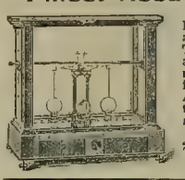
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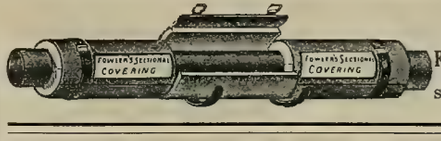
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One of the means by which this result has been accomplished is that of having a corps of skilled engineers constantly in the field, planning and installing works wherever such service is required in any part of the world.

The cut here referred to shows one of their engineers, with native assistants, making a survey for a large power station in the Malay Peninsula, not far from Singapore—the plant being for the purpose of supplying several large towns with power and light by means of electric transmission.

In addition to the work here referred to, this firm shipped by the last steamer three wheel plants to the island of Java, in the East Indies, including pipe lines and all appliances connected therewith. These plants are for the purpose of furnishing power to run the machinery of sugar, tea and coffee plantations, as well as furnishing light.

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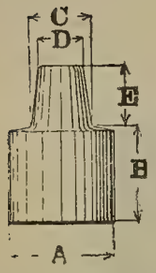
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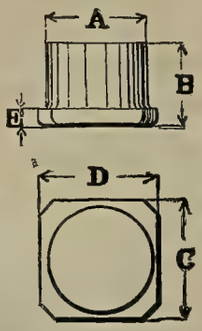
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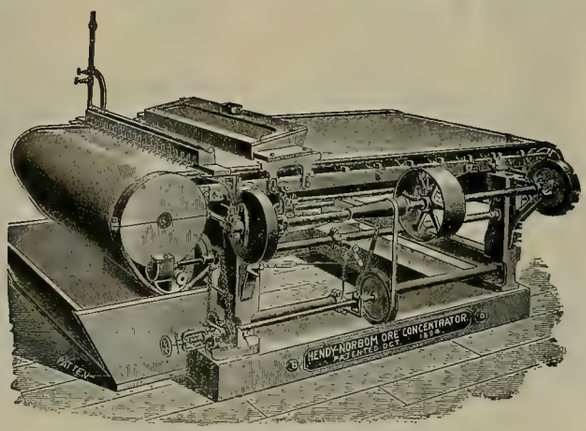
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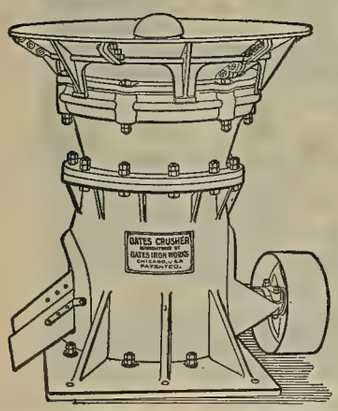
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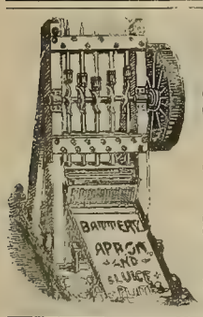
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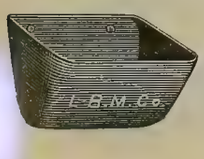
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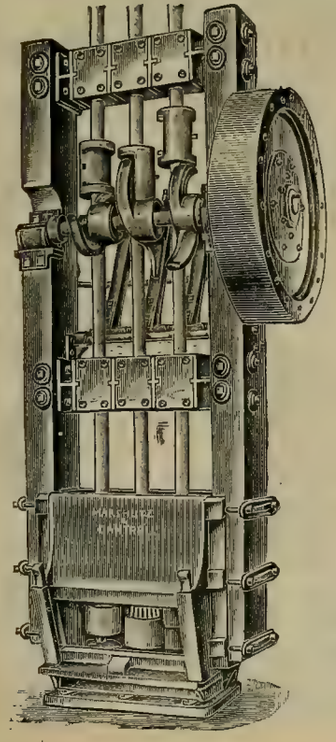
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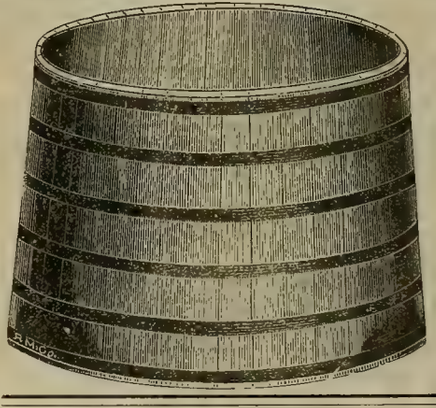
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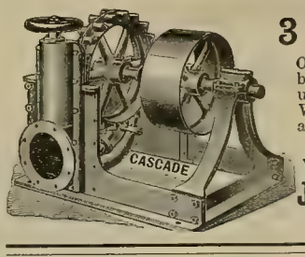
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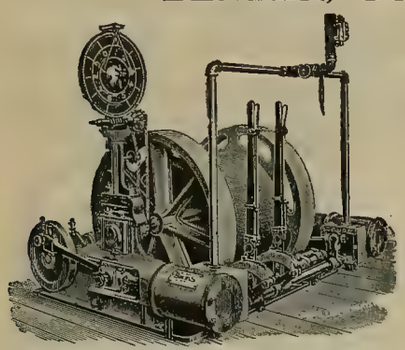
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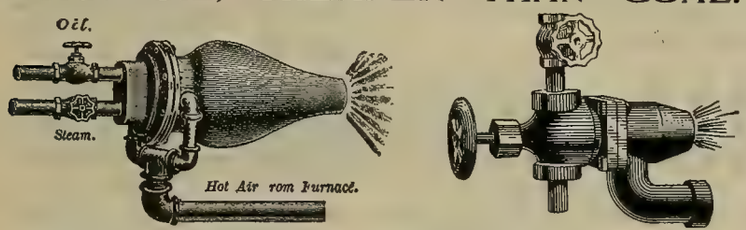
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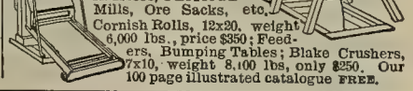
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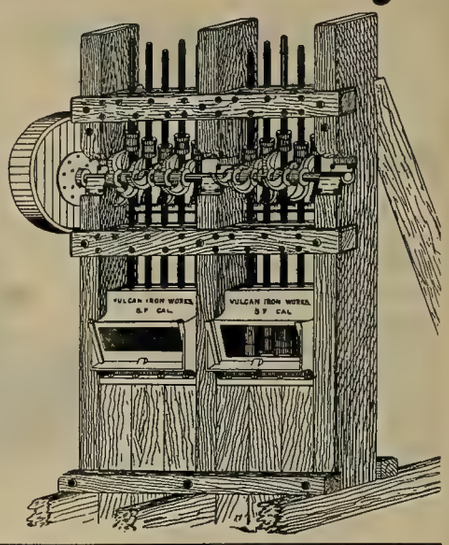
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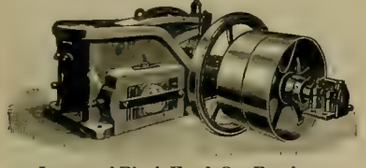
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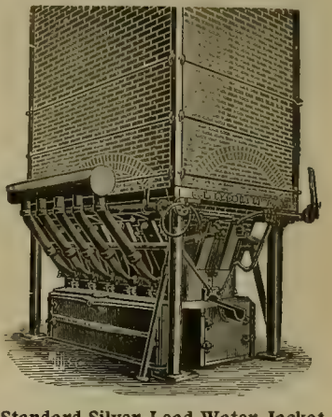
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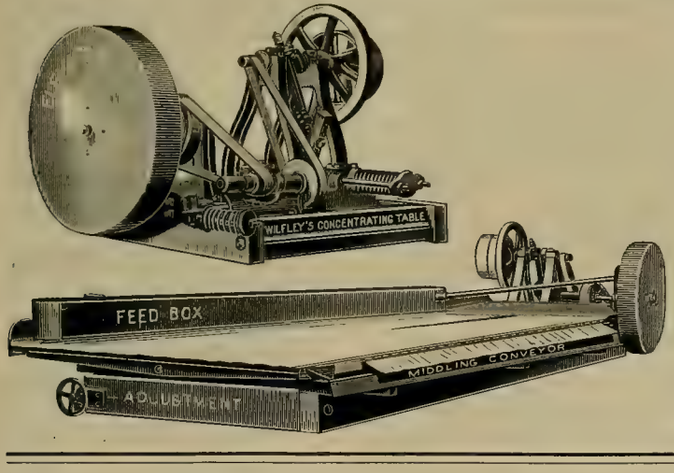
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And claim for it BETTER work than any Concentrator made, with a capacity of from 15 to 25 tons per day of 24 hours. It is simplicity itself. No moving belts or intricate parts. Anyone can learn to operate in an hour.

For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Col.; M. E. Smith Concentrator, Golden, Col.; Mary Murphy Mine, St. Elmo, Col.; W. E. Renshaw, Mayflower Mill, Idaho Springs, Col.; W. H. Bellows, Boyd Mill, Boulder, Col.; H. E. Woods, Denver, Col.

ROMLEY, COLO., Jan. 19, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Answering yours of the 5th inst., would state that after a thorough trial we have discarded seven Woodbury Tables and two Johnsons and adopted the Wilfley Concentrating Table, which we think up to date is the best table in the market, so far as our knowledge is concerned. Yours very truly,

[SIGNED] B. B. MORLEY, M'g'r Golf M. & M. Co.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

PRICE, $450.00.

THOUSANDS Now in Use Over the World.

TRUAX Patent Improved

Automatic Ore Cars.





THEY ARE THE BEST AND CHEAPEST.

SCHAW, INGRAM, BATCHER & CO., AGENTS,

Pat. Jan. 5, '92, Aug. 27, '95. *Send for Catalogue.* Sacramento, California.

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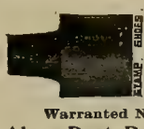
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FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 220 Market St., San Francisco.



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Also, Best Refined Cast Tool Steel, Well Bit Steel, Heavy and Light Iron and Steel Forgings of All Descriptions.

PRICES UPON APPLICATION.

GEO. W. PENNINGTON & SONS, 218 and 220 Folsom Street, SAN FRANCISCO, CAL.

Market Reports.

The Markets.

SAN FRANCISCO, Feb. 18, 1897.

Owing to continued unsettled weather, business has been slow, yet the volume of goods sent out the past week shows an increase over the present week. It is the consensus of opinion that we will enjoy a larger and more healthy trade this year than for over half a decade past. This opinion seems to be well grounded and based on the established fact that present prospects point to this year being the banner year for big crops of all kinds. The moisture in the ground extends deeper than for over six years, which insures a good supply for crops at the most trying time; the acreage seeded to wheat shows a large increase, as does the acreage devoted to nearly all kinds of farm products, while there will be a large increase in the numer of fruit-bearing trees. This will call for a largely increased number of hands, which means better times for wage-earners. Turning to the gold mining industry, all indications point to the boom not only continuing, but enlarging. More mills will be running, many of the older ones have been enlarged, many new mines will be bullion producers, a large number of the older ones will increase their output, while exploiting of new properties will be more active, as will prospecting for new gold finds. The above means an increased call for mining machinery, which ought to cause iron workers to run full-handed and on full time.

The local money market is dull with no call outside of bullion and gold coin for remitting to the East. The demand from this source caused the premium on eastern exchange to advance to such figures as to make it now profitable to buy or borrow gold bullion and coin for sending forward by rail than to buy exchange. Referring to this movement our New York correspondent writes: "The arrivals of gold from San Francisco are due to the fact that there is a great scarcity of New York exchange and currency on the Pacific coast just now so that the only way to send money East is in the form of gold. This movement is quite usual at this time of the year and not of itself at all significant. A number of reasons exist for it, of which one is the fact that business is very dull on the Pacific coast and there is very little employment for credit in that section. The effect is likely to be a further increase in the visible stocks of gold, which are now larger than they have been at any time since the currency trouble became acute in 1893. Further arrivals of gold from San Francisco are likely before long."

Our correspondent, it is quite evident, is not properly advised. While the call here is slow and will continue to be until after the first week in March yet the heavy shipments hence are to avoid paying taxes and also to make payments for considerable of the gold secured last year from New York when it was found that a run on the banks might be started any day.

New York Silver Prices.

NEW YORK, Feb. 18.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	29¾	64¾
Saturday	29¾	64¾
Monday	29 11-16	64¾
Tuesday	29 11-16	64⅝
Wednesday	29 11-16	64⅝
Thursday	29 11-16	64⅝

	Copper.	Lead.	Iron.	Tin.
Friday	12 00	3 25	10 25@12 50	13 45
Saturday	11 90	3 25	10 25@12 50	13 45
Monday	11 85	3 25	10 25@12 25	13 35
Tuesday	11 90	3 25	10 25@12 50	13 35
Wednesday	12 00	3 25	10 25@12 50	13 40
Thursday	12 00	3 30	10 25@12 50	13 45

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	25c Prem
New York Telegraphic Transfer	27½c Prem
London Bankers' 60 days	$4.86½
London Merchants	$4.85
London Sight Bankers	$4.88½
Refined Silver, peroz., 1000 fine	64⅝
Mexican Dollars	51½@52

SILVER.—The market settled back a point in London and also at the East towards the close of the week. According to London cables the market in that city must be quite sensitive, for with the least improvement in the inquiry from India or elsewhere the price strengthens. There have been more India Council bills put on the English market, which has met to a large extent exchange requirements, thereby operating against the demand from that quarter for the white metal. New York mail advices continue to note free shipments of silver bullion, but notwithstanding this prices abroad do not shade off much or get below 29 11-16d in London.

The last steamer hence for the Orient took out for Japan silver bullion valued at $65,000, and to Hong Kong $236,500. This is quite an increase in the shipments.

MEXICAN DOLLARS.—The market has held to fairly steady prices. The China steamer took out the past week 361,385. The next outgoing steamer will also take out considerable.

COPPER.—The market eased off at New York and then strengthened, closing fairly steady. The decline was due to foreign business holding off. Our New York correspondent, writing on the subject, says: The movement of ingot in the form of deliveries on old contracts continues heavy and, to all accounts, a large portion of the current output of producers is absorbed. Hence the offerings for prompt shipment are unusually light and prices are held quite firmly. New business continues rather slow, however, since no inducements are being made to large buyers, while the general belief that there will be copper enough to go around in the near future apparently restrains excessive buying. Sellers' prices remain at 12c for Lake Superior ingot, 11¾c for electrolytic and 11½@11¾c for casting stock.

The local market is quoted as follows:

Ingot, jobbing	14¼@—
Ingot, wholesale	—@13¼
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17c

QUICKSILVER.—There is no particular change in the general situation. The offerings from outside sources have been about all absorbed, which gives the market a steadier and firmer tone. New York mail advices state that the market there and in London is firmer. Under date of February 15 the New York market is reported as follows: Quicksilver price for lots of 100 flasks has advanced sharply, and is now quoted at $38 per flask. The rise is understood to be due to an advance in the foreign market. Jobbing prices are consequently firmer at 52@53c, and the indications suggest an advance ere long on mercurial preparations.

BORAX.—There is a continued free movement Eastward, where the demand appears to be improving.

The market is quoted as follows:

Refined, in car lots	5
Refined, in sacks	4¾
Powdered, in car lots	4½
Concentrated, "	5

LEAD.—At the East and in England this metal continues the attractive feature for futures. The dealings have been quite heavy for both cash and future delivery. The improvement in prices, it is said, has been largely based on legitimate trade wants. The *Oil, Paint and Drug Reporter* of New York says: "The smelting of Mexican as well as British ores in bond here and the exportation of the lead product has an advantage of something like $10 per ton over the withdrawal of the product for consumption here, and it requires no other stimulus than this additional product to induce smelters to take advantage of the foreign outlet to the fullest possible extent. The only effect of the action of the Colorado smelters is to open up an outlet for more of the British lead than could be consumed here and to render it in a higher degree independent of the American consumers."

Our market is quoted in jobbing lots as follows:

Pig	3 75	@	3 85
Bar	—	@	4 00
Sheet	—	@	5 25
Pipe	—	@	4 50

SHOT.—There is a stronger tone to the market.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 20
Drop, B and larger sizes, " "	1 45
Buck, Balls and Chilled, do, " "	1 45

TIN.—Plates are irregular, with a good inquiry ruling for American. Pig has fluctuated slightly. The East reports a sensitive market, with a strong upward tendency.

We quote as follows:

Pig, per lb	14½c@ —
Plate, I C coke, heavy, per box	$4 05@ —
" " light, "	3 95@ —

IRON.—The markets at the East have shaded off, closing weak. This decline in the face of heavy purchases of steel rails by railroad companies indicates a strong competitive selling fight on between producers East.

The New York *Journal of Commerce* just to hand says: It was learned on very good authority that the orders for steel rails placed since the break in prices involve a total of 500,000 to 600,000 tons. Of this amount Eastern manufacturers captured 150,000 to 200,000 tons, the Illinois Steel company probably 300,000 tons, and other manufacturers the balance. As the reports go, the Carnegie interest was considerably behind in the procession, and finally cut prices to the basis of $16 f. o. b. at their mill to avoid losing more orders. This the interest in question does not admit, but it is an open trade secret that Western orders were taken at $16@17. Eastern mills and the Illinois Company, it is understood, now have enough business in hand to keep their works in operation for six months or more.

Our New York correspondent writes: "It is believed that the first step by the Carnegie-Rockefeller combination will be to make heavy sales of iron ore for delivery during the coming season without regard to the pool. This will probably cause a war on prices by all the iron mining companies of northern Michigan and Minnesota. In the previous years the production of every important mine in the Lake Superior region has been allotted and prices fixed before this time, but this year nothing has been accomplished with reference to an agreement. President Bacon, of the Minnesota Iron Company, says there has been no agreement thus far for 1897. Two tons of iron ore can be mined in the Lake Superior region for every one that can be sold, and over two tons of steel rails can be made for every one used by the roads. This unlimited capacity will give boundless opportunities for warfare. Either of the great companies of the Mesaba range can flood the ore market."

AMERICAN.

	To Arrive.	Spot.
Sloss	$21 00	$23 50
Thomas	22 00	23 50
Salisbury	30 00	33 00

ENGLISH.

Barrow	$21 00		$23 00
Gartsherrie	21 50		23 00

COAL.—The market is practically unchanged. The demand holds good. The supply of foreign on spot and to arrive is only fair. Imports of domestic are fairly few.

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

ANTIMONY.—The market shows slightly more animation but at unchanged prices. At the East mail advices reported a little more doing.

Our market is quoted at 7⅛@8c in a jobbing way. New York mail advices quote 7¼c for Cookson's, 6½@6⅝c for Hallett's and 6¼c for Japanese.

LUMBER.—There is an improving export movement from this port and up north.

Redwood, Fluming	17 00	@	— —
Pine	14 00	@	19 00
Spruce	26 00	@	31 00

NAILS.—The market is below the cost of production.

Wire, carloads, basis per keg			
" jobbing, " "			$2 20
Cut, carloads, " "			
" jobbing, " "			2 00

POWDER.—The demand is improving. The market is quoted as follows:

Hercules, No. 1*, per pound	11½c
" No. 2, " "	8½c

SPELTER.—Our market is active and firm at 5 cents a pound in a jobbing way. The New York market is reported devoid of new interest. For large parcels $4.05 to $4.15 per 100 pounds is quoted—jobbing higher. English cables report a quiet market at the late shading in prices.

NICKEL ANODES.—There is a light call reported, with the market quoted at 60 to 65 cents per pound.

PLATINUM.—The market is fairly steady at $10 to $15 per ounce.

ZINC.—There is a fairly good movement. Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is reported fairly steady under a light call.

We quote in jobbing lots at 50 cents per pound for ingots.

BISMUTH.—A fair demand is reported in our market at $1.50 per pound in a jobbing way.

PHOSPHORUS.—The market is steady to firm.

We quote in a jobbing way at 70 to 75 cents per pound.

Chemicals.

Jobbers report that, while general trade is quiet now, the outlook is quite promising for a fairly free movement during the spring months.

CAUSTIC SODA, 60%.—The market is reported quiet but steady at 3¼c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is quiet but firm at $1.70 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a fair demand at 2½c a pound from stores.

NITRATE OF SODA.—The New York market is strong at $1.92½ per 100 pounds, owing to the fact that no stock is obtainable there except from store. The advices from Chili are to the effect that the combination will restrict the output and keep values at around $3.92½ per 100 lbs for 95%. Our market is quoted from store at 4 cents per 100 lbs for 95%.

ACETIC ACID.—Eastern advices do not report any change. Our market is fairly steady. We quote in a jobbing way at 6@12c per lb in carboys, according to make.

NITRIC ACID.—The market is steady from 6½c per lb in carboys.

SULPHURIC ACID.—The demand is light. We quote in a jobbing way at 1½c per lb for 66%.

BLUE VITRIOL.—The East reports the market in good position. With us the market is fairly firm. We quote in a jobbing way at 4¼c per lb.

Mining Share Market.

SAN FRANCISCO, Feb. 18, 1897.

The market for mining shares the past week has been manipulated downwards by a master hand. It would seem as if the same person has been at the helm for some time past and has the gift to attract outsiders to a certain mine, while working its shares to get the entire list lower, so as to freeze out holders at low prices. The moving of Con. Virginia up $1 a share and causing the rest of the list to sympathize only slightly, and then at each break cause the other shares to go down proportionately, but at the rallies in the former the others rallied only slightly. By working it in this way, everything sells lower than before the Con. Virginia advance, while the outside public has considerably less shares—sold out by brokers, or else by themselves, for fear of assessments and much lower prices. At this writing it looks as if there will soon be another up-move in the market, but what will take the lead it is hard to say. The action of the market indicates that the insiders are after shares, and, if so, they will get what is wanted, if they keep prices down for months to come. Interest centers on the work in Con. Virginia, but, from all we can learn, the position taken in this department regarding it is thoroughly correct. Rumors begin to circulate of an improvement in Chollar on the Brunswick lode, 500-foot level. On this level they are running a south drift, but from all that can be learned, we think it was not the object to strike the downward continuation of the ore until the drift had been well advanced, and, perhaps not then, until after connection was made with the levels above. If the ore vein on this level is found to be wider and the grade does not show any falling

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.	Secretary.
Alma G M Co, Cal	1	5c	Feb 9	Mar 13..Mar 29	D Gutmann, 320 Sansome
Andes S M Co, Nev	43	10c	Feb 1	Mar 8..Mar 31	Jno W Twiggs, 309 Montgomery
Best & Belcher M Co, Nev	61	25c	Jan 26	Mar 2..Mar 23	M Jaffe, 309 Montgomery
Confidence G M & M Co, Co	1	10c	Jan 19	Feb 27..Mar 20	F Aureguy, 320 Sansome
Con Imp M Co, Nev	38	1c	Feb 16	Mar 23..Apr 13	C L McCoy, Mills Bldg
Eureka Con Drift M Co, Cal	7	5c	Jan 30	Feb 26..Mar 20	D M Kent, 330 Pine
Eureka Con M Co, Nev	14	25c	Jan 18	Feb 23..Mar 15	H P Bush, 134 Market
Gold Hill M Co, Cal	11	25c	Jan 8	Feb 15..Mar 4	C A Grow, Mills Bldg
Gray Eagle M Co, Cal	45	5c	Dec 28	Jan 30..Feb 23	W J Gurnett, 308 Pine
Hartmann Mining Co, Cal	1	5c	Dec 22	Feb 1..Feb 23	G W Peer, 4 Montgomery
Jamison M Co	9	5c	Nov 27	Feb 24..Apr 21	Sam W Cheyney, 120 Sutter
Julia Con M Co, Nev	28	5c	Jan 21	Feb 26..Mar 19	J Stadtfeldt Jr, 309 Montgomery
Marguerite G M & M Co, Cal	5	10c	Jan 14	Feb 25..Apr 8	Chas Peach, 237 Twelfth
Mineral Hill M & S Co, Cal	1	5c	Jan 4	Feb 15..Apr 13	Chas Peach, 210 Sansome
Occidental Con M Co, Nev	26	10c	Feb 10	Mar 16..Apr 6	A K Durbrow, 309 Montgomery
Ophir S M Co, Nev	70	25c	Feb 5	Mar 10..Mar 30	E B Holmes, 309 Montgomery
Reward G M Co, Cal	18	2c	Feb 6	Mar 11..Mar 27	S W Backus, Mills Bldg
Thorpe M Co, Cal	5	5c	Jan 13	Feb 23..Mar 15	A F Frey, 44 Phelan Building
Troy M & D Co, Alaska	3	10c	Feb 2	Mar 9..Mar 26	O Kyst, 421 Mission
Utah Con M Co, Nev	24	5c	Jan 14	Feb 17..Mar 8	A W Havens, 309 Montgomery

WILL NEGOTIATE with owners or their duly authorized agents only.

WILL INVESTIGATE only thoroughly bona-fide properties, either Mines, Prospects or Mineral Lands, whose owners are willing to make reasonable terms. When sending reports on properties also send terms on which you are willing to sell or lease.

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WILL EXAMINE on reasonable terms all kinds of Mines, Mining Properties and Mineral Lands as to their value, method of working and the condition of their titles.
WILL GIVE Options, Leases, Bonds and Contracts on all kinds of Mines, Mining Properties and Mineral Lands.
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off, then the company will be able to develop a good property. It is rumored that in Ophir an improvement is coming in, but the price for shares does not show it if there is. With the coming of D. O. Mills to this coast the price of the Gold Hill shares go down. This has never failed, and why it is so no one seems to know, although they do considerable guessing. The Standard Con. Company of Bodie has declared a 10-cent dividend, payable March 23. The Bodie, Mono and Bulwer companies have disincorporated and have no longer a legal existence, the Standard Company having absorbed them.

There is a report current that George W. Grayson will contest for the control of Hale & Norcross, and that Col. Alvinza Hayward will support him. If there is a contest it is not of much moment, or else one of the contesting parties, feeling assured of success, does not compete for shares. If Mr. Grayson should get control of Hale & Norcross it is to be hoped that he will manage it better than the Bullion. This mine ought to be a bullion producer and not an assessment producer. It is said that to the west, in what is known as the old Crœsus ground, there is very rich gold-bearing ore that can be extracted and the mine made to pay dividends. The Fox suit against the old management of Hale & Norcross will not come up in the Supreme Court before July next.

From the Comstock mines the news is far from an exciting character, and none is looked for until the insiders have frozen about everybody out of their holdings. The work from one end of the lode to the other is being done in a way not calculated to strike a rich body of ore. In Utah they are running an east crossdrift in the old west surface tunnel workings. In Sierra Nevada they are still at work on the 900-foot level and also Layton tunnel level. On the 900-foot level in Union they are pushing, but slowly, three east crossdrifts. The formation in them was, at last advices, clay and porphyry. In Mexican, on the 1000-foot level, the west crossdrift is in over 255 feet, with the face in porphyry, showing clay separation. At last advices there was a slight seepage of water. This latter is accepted as a good sign, but it is not at all likely it will be taken advantage of and work prosecuted farther west so as to strike the lode. It is more certain that work will be stopped or else turned before many days. From Ophir official advices do not report anything of consequence doing in the Central tunnel level. The west crossdrift on the 1000-foot level is in over 390 feet. At last advices the face was in soft porphyry, seams of clay and lines of low-grade quartz. Connection has been made in Con. Virginia between the 1650-foot and 1550-foot levels, but the expected boom in shares did not materialize. Instead of prices going up they went down. When they have the small vein better developed for working, enough good to high-grade ore ought to be taken out to nearly pay expenses. There is no change in the workings on the 1750-foot level. On the 1000-foot level a south drift is being run from No. 2 west crossdrift.

They are running an east crossdrift on the 175-foot level in Andes. The Best & Belcher and Gould & Curry east crossdrift from the 800-foot Bonner shaft level has been extended a total distance of over 390 feet without having found anything of greater value than porphyry. The work reported in Savage is practically unchanged. They are still repairing the shaft in Hale & Norcross. They are raising ore from the 900-foot level. From the tenth floor above this level they have started an east crossdrift. No work is reported in Chollar. The south drift in Potosi ran from the raise connection on the tunnel level is out over 110 feet. At last advices it was chiefly in quartz giving assays of $5 to $12 a ton. They are still extending the north drift in Bullion. They continue, so it is said, to fool away time and spend money by playing work on the 500-foot level. The joint Confidence, Challenge and Con. Imperial west crossdrift has been extended the usual few feet. At the rate it is being "pushed," it will strike the west lode about April next. No advices have been received of work in Challenge. In Confidence there is nothing new to report. The same remarks apply to Yellow Jacket. In Crown Point work is confined largely to the levels heretofore reported. Belcher and Seg. Belcher's official letters for the public do not report from what level they are taking out ore or anything regarding the work; but, it is said, that private letters do give the information and they also state that quite a body of ore has been developed. Of the correctness of these reports the writer knows nothing, but from the fact that official letters do not give particulars as to the work it looks as if they are correct. Overman continues to raise a few tons of ore. Advices from the 1100-foot level workings in Caledonia are highly encouraging, but no one seems to have any more faith in the management of this mine than of some of the others, and therefore favorable news counts for nothing with them. From Alta the news is essentially unchanged.

From the Brunswick lode nothing of interest has come to hand. In Occidental they are running an east crossdrift on the 550-foot level. On the 750-foot level and 850-foot level they are running south drifts. The formation on the 850-foot level was quite favorable at last advices. In Chollar interest begins to center on the south drift on the 500-foot level. At last advices they were in over 110 feet, with the formation softer and quite favorable. On the 400-foot level they are running a south drift and also upraising. The latter was in $20 to $25 ore 5 feet in width. No change is reported in the work on the 200-foot and 300-foot levels. From the January cleanup they got $7867 in gold, and silver bars valued at $1683. They are shipping ore to the mill on February account. The work that is being done by Best & Belcher, Gould & Curry and Con. Virginia on the 300-foot level is an east crossdrift and a south drift. Both, at last advices, were in quartz. They have resumed sinking the shaft.

The following illustrates the changes of the week:

MINES.	Feb. 11.	Feb. 18.
Alpha	$ 19	$ 06
Alta Consolidated	05	04
Andes	....	11
Belcher	....	22
Best & Belcher	68	62
Bodie	....	....
Bullion	04	11
Challenge	16	36
Chollar	91	....
Confidence	98	83
Consolidated California and Virginia	2 10	1 90
Consolidated New York	....	....
Crown Point	....	....
Exchequer	....	....
Gould & Curry	45	30
Hale & Norcross	1 70	1 05
Justice	04	....
Mexican	42	34
Ophir	92	80
Overman	12	10
Potosi	49	42
Savage	46	40
Sierra Nevada	....	34
Union	....	33
Utah	....	....
Yellow Jacket	29	25

San Francisco Stock Board Sales.

SAN FRANCISCO, February 18, 1897.

9:30 A. M. SESSION.

200 Alpha	06	650 Ophir	78
100 Alta	04	100 Overman	10
400 Belcher	21	600 Potosi	39
300 Best & Belcher	60	100 Savage	40
100 Bullion	11	300 Sierra Nevada	34
200 Challenge	36	100 Standard	1 65
150 Con Cal & Va	1 85	300 Union	33
150 Confidence	83	400 Yellow Jacket	24

SECOND SESSION—2:30 P. M.

400 Ophir	80	600 Yellow Jacket	25
50 Mexican	34	300 Belcher	22
50 Gould & Curry	30	200 Bullion	11
600 Best & Belcher	62	100 Union	33
300 Con Cal & Va	1 90	200 Occidental	08
200 Savage	40	100 Andes	11
500 Potosi	42	50 Standard	1 65
330 H. & N	1 05		

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING FEBRUARY 9, 1897.

576,716.—LAMP—E. Boesch, S. F.

576,721.—TROLLEY SYSTEM—W. G. Caffrey, Reno, Nev.

576,805.—BOTTLE—E. Campbell, Dayton, Wash.

576,555.—FOUNTAIN PEN—H. J. Cowger, Pacific Grove, Cal.

576,954.—SAVINGS BANK—C. L. Dawson, Tacoma, Wash.

576,960.—ELEVATOR DRIVE WHEEL—G. S. Fouts, San Jose, Cal.

576,726.—BICYCLE SEAT—Getz & Westall, S. F.

576,871.—METAL PIPE—C. S. Hamlin, Los Angeles, Cal.

576,992.—BLACKING BRUSH—W. Hayball, Pendleton, Or.

576,674.—ROPE DRIVING APPARATUS—J. H. Hoadley, S. F.

576,729.—ADJUSTABLE TRUCK—E. Ireland, Winters, Cal.

576,592.—CHECK BOOK—M. Leventritt, S. F.

576,868.—OPERATING CARS ON GRADES—Lynch & Foster, S. F.

576,818.—SPRAYING APPARATUS—W. J. McGraw, Walla Walla, Wash.

576,688.—PRUNING SHEARS—C. E. Perry, S. F.

576,897.—CUE CHALKER—C. Salmond, S. F.

576,916.—PUMP—A. W. Thierkoff, Redding, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

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Assessment Notices.

MARGUERITE GOLD MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 14th day of January, 1897, an assessment (No 5) of 15 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 8th day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS PEACH, Secretary.

Office—237 12th street, San Francisco, California. Office hours from 4 to 6 o'clock P. M.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 13th day of January, 1897, an assessment (No. 5) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of February, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. PREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the 26th day of January, 1897, an assessment (No. 61) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on TUESDAY, the 23d day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room No. 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

ANDES SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia City, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of February, 1897, an assessment (No. 43) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 20 and 22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of March, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 31st day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Rooms 20 and 22, Nevada block, 309 Montgomery street, San Francisco, California.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9), of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 30th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

MINERAL HILL MINING AND SMELTING CO.—Location of principal place of business, San Francisco, California; location of works, Spenceville, Nevada County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 4th day of January, 1897, an assessment (No. 1) of five cents (5c) per share was levied upon the whole of the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 210 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of February, 1897, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 25th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. PEACH, Secretary.

Office—210 Sansome street, San Francisco, California. Office hours from 1 to 3 o'clock P. M.

POSTPONEMENT.

At a meeting of the Board of Directors of the Mineral Hill Mining and Smelting Company, held on the 15th day of February, 1897, it was resolved that any stock upon which the assessment shall remain unpaid on the 15th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on TUESDAY, the 13th day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

CHAS. PEACH, Secretary.

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Apply at 373 Sixth Street, Oakland, Cal.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Silver Star Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 10th day of February, 1897, an assessment (No. 26) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of March, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 6th day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

HARTMANN MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Chili Gulch District, Calaveras County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 1) levied on the 22nd day of December, 1896, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
C. E S ephens	2	3,000	150 00
H. O rsoco	6	2,500	125 00
J. P. G. Harrell	10	2,000	100 00
C. B. Schofield	14	2,000	100 00
C. C. Sheparson	9	3 380	169 50

And in accordance with law, and an order from the Board of Directors, made on the 22nd day of December, 1896, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, Room 46, No. 4 Montgomery street San Francisco, California, on TUESDAY, the 23d day of February, 1897, at the hour of 5:30 o'clock P. M of said day, to pay said Delinquent Assessment thereon, together with costs of advertising and expenses of sale.

G W. PEER, Secretary.

Office—Room 46, No. 4 Montgomery street, San Francisco, California.

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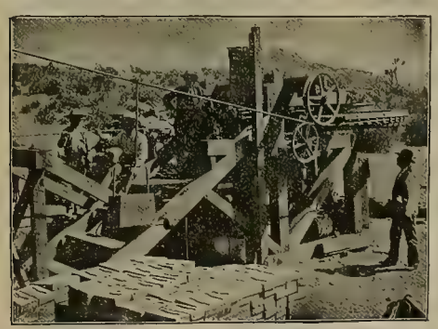
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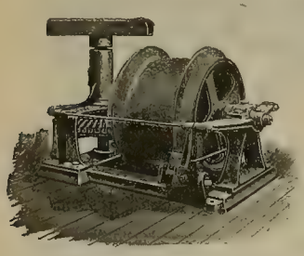
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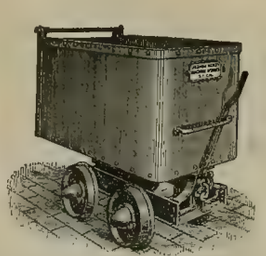
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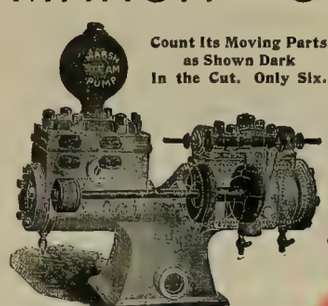


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The Miner's Inch.

There has been introduced in the California Assembly, and favorably reported upon by the Committee on Mines and Mining Interests, a bill "legally defining what a miner's inch shall consist of." It is a remarkable bill, worth quoting, and is as follows:

"For a uniform system of measuring water when the term 'miner's inch' is used, it is hereby declared that a 'miner's inch' of water shall be such a quantity as flows from an orifice one inch square through a two-inch plank, with still water standing at a depth of six inches above the top of the orifice, such a discharge to be not less than one and one-half cubic feet per minute, equal to twelve gallons."

It will be observed that this bill prescribes that a "miner's inch" shall be equal to a flow of not less than one and one-half cubic feet of water per minute, "*equal to twelve gallons.*" Does the author propose to change the measures now in use in this country? According to all the accepted authorities, and as most school boys know, one cubic foot of water is equal to about 7.48 gallons—or, to be more exact, it is equal to 7.4805 gallons. Upon this basis one and one-half cubic feet of water would equal 11.22075 gallons. The standard American gallon, or old English "wine" gallon, contains 231 cubic inches.

That there is need for a statute providing a standard for the value of a miners' inch there should be no question. By choosing a flow of one and one-half cubic feet per second we shall have one that would be satisfactory, which cannot be misunderstood and which will be a basis for easy calculation, for in this case 40 miner's inches would equal a flow of one cubic foot per second, the terms in which hydraulic engineers make their calculations. It will be in the power, then, of any farmer or miner purchasing small quantities of water by the inch to obtain a box of given dimensions, and by noting the time of the flow very easily determine the amount of water he is getting.

For the State to prescribe through what orifice and under what conditions the water must flow is a piece of supererogation as valueless as it would be to lay down the shape of vessels by which gallons must be measured. The conditions of the case must determine how the water shall be measured. What is wanted is a standard for the quantity only.

Colorado and other States have by legislative enactment laid down the amount of water in cubic feet per minute or second that shall equal the miner's inch. In this State there are many different miner's inches, owing to the many different ways of measuring. On this subject A. J. Bowie, in his treatise on "Hydraulic Mining," says: "The miner's inch of water is a quantity which varies in almost every district in California; no one gauge has been uniformly adopted, nor has any established pressure been agreed upon under which the water shall be measured. * * * The apertures through which the water is measured are generally rectangular, but vary greatly in width and length, being from 1 to 12 inches wide, and from a few inches to several feet long. The discharges are through 1-inch, 1½-inch, 2-inch and 3-inch planks, with square, or with square and chamfered edges combined, or not, as the case may be." The Smartsville inch equals, according to Bowie, 1.76 gallons per minute, the Park Canal and Mining Company's inch in El Dorado was 1.39 gallons per minute, and experiments made by Hamilton Smith in 1874 through a rectangular slit, 50 inches long, 2 inches wide, through a 3-inch plank chamfered, the outer inch under 7-inch pressure above the center of the opening, showed an inch to be equal to 1.57 cubic feet per minute. Experiments made by A. J. Bowie have shown that an aperture 12 inches high by 12¾ inches wide, through a 1½-inch plank, with a head of 6 inches above the top of the opening, will discharge 200 miner's inches, each equal to 1.4994 cubic feet per minute.

This *module* has been adopted rather generally for measuring large amounts of water and for that purpose is very convenient, while it would be useless for measuring smaller quantities. So the aperture named in the proposed bill would be of no use except for measuring very small quantities. If the Legislature will state the flow per minute that shall equal a miner's inch, it will have done its duty.

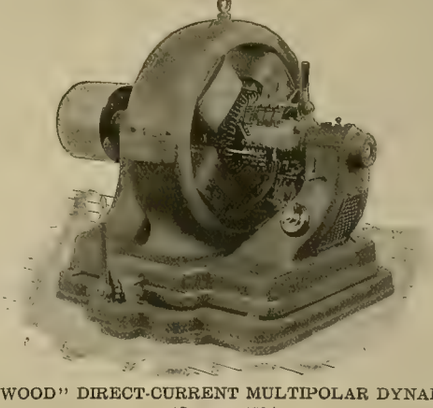








DITCH CONSTRUCTION IN IDAHO.—(*See page 172.*)



"WOOD" DIRECT-CURRENT MULTIPOLAR DYNAMO.
(*See page 176.*)

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J. F. HALLORAN.....General Manager

San Francisco, February 27, 1897.

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The Government and Mining.

In early days in California, Australia and other regions where gravel mining was being done, it was a very common thing to see miners desert or pass over good claims to go on in search of "the place where the gold came from." In those days there were few trained geologists, and none who had investigated the subject of gravel deposits so as to be able to tell the miners that any search for a "mother lode," or anything of that sort, where almost pure gold could be dug out, was useless. The impression prevailed that the gold came from an almost pure source, and was later scattered through the gravels.

Doubtless more labor and money were lost in these wild and fruitless searches than in what would now be considered good mining. The men engaged in the industry had had no previous experience and could not learn from the experience of predecessors. Had the Federal Government properly appreciated the value of mining to the country, and made a slight effort to render assistance, it would have made a better investment than it ever has in any other way. To-day but little aid from the Government is received and millions are being lost yearly for want of it.

This can easily be seen by contrasting the work done for the mining industry in British Columbia by the Canadian Government with the attitude of the United States Government to the mining industry. The fostering care of that more paternal Government has developed in a little over two years one of the richest gold-producing fields in the world. Yet had no more been done than is done by the United States Government for new or old mining districts, British Columbia would not now be making such a stir in the world.

On the Yukon river, at the Clondyke placers, the miners—American citizens as well as British subjects—are rejoicing over a report that their mines have been found to be on the Canadian side of the line. There is no country in the world that has derived more benefit from the mining industry than the United States, and no government makes less effort for its development.

The geological survey of the United States is at present under the direction of a man who appreciates the value of the work that can be done to aid mining, but is hampered for want of means. Less than half a million dollars a year is spent and much of that, perforce, is spent in purely scientific work. It is to be hoped that Congress will soon be impressed with the idea that no money spent can bring larger returns, nor add more to the wealth of the country, than upon the economic work of the geological survey.

The Prospector's Flight Northward.

Now again is coming the season when the prospector takes his flight northward. A few months ago he was driven out of Alaska and from the mountains of British Columbia, Washington, Idaho and northern Oregon, when the snow fell, and made his way to the more congenial winter climates from southern Oregon to Mexico.

As much as all the West from the Black Hills to Vancouver Island, Colorado and New Mexico to California and from Alaska to Mexico has been gone over by prospectors these many years, there are being made more discoveries than ever before of mines that will be of lasting value and of new districts that will attract the world's attention. The prospector of to-day in spirit and character is much like the prospector of years ago, but he knows more and the results of his better work is shown in the continuous reports of strikes being made all over the western side of the continent. What is most significant is the fact that a very large proportion of these are made in districts that have been gone over by the prospector time and again for the past quarter of a century or more. The Fraser river excitement took thousands from California in the fifties only to be disappointed. Now with modern methods the mines promise to yield large returns and are attracting the attention of capital.

In the Black Hills rich mines are being found in rock that was passed over because it was not like that of the first discoveries. In Wyoming thousands of acres of placer are being exploited and hundreds of thousands of dollars is being spent in water ditches. Yet Wyoming has never been known as a gold mining State. In Nevada the same story is being told. In New Mexico and Arizona the demand for copper has been the cause of prospecting for ore bodies carrying that metal, with the result that enough promising discoveries have been made to greatly add to the wealth of those Territories. So in Montana, Idaho, Colorado, Alaska and other parts of British Columbia, new districts, new mines and unexpected formations carrying valuable minerals are being constantly discovered by the prospector.

Yet, for all he is doing, he receives little reward and little credit. Capital comes in, helps him out with a "grub stake" and enables him to go on again like the Wandering Jew and the capitalist goes to the Senate or Europe.

Mr. Bowie's Article.

On page 172 will be found an article by Aug. J. Bowie on ditch construction in Idaho, in which he gives the data gathered in his experience there in 1895 and 1896. But for the work done by Mr. Bowie in writing his "Treatise on Hydraulic Mining," much of value that was learned in California in developing that industry would have been lost to the world with the partial cessation of hydraulic mining about fifteen years ago. Many of the best engineers do not publish the results of their observation and experience for the benefit of others. The work that Mr. Bowie has done in this way never brought him any return pecuniarily, but has been of inestimable value to others. It must, however, be a source of satisfaction to him to have learned that unselfish work brings great rewards in the way of satisfaction for doing a public good.

Ditches and canals have been dug from the earliest days of recorded history, yet since the beginning of hydraulic mining in California more has been learned of the conveyance of water than in all the preceding time. An example of the progress in ditch and flume construction is shown in some of the newer methods adopted in the construction of the ditch referred to in Mr. Bowie's article. It is timely, because now more than ever is there an activity in gravel mining in all parts of the world where there are auriferous gravels. In Wyoming, Colorado, Idaho, Montana, Nevada and British Columbia there are many large areas of auriferous gravels that are being opened up, and ditches from two or three to nearly one hundred miles in length are being constructed. In Siberia and Russia it is predicted that within a few years great store of gold will be taken from the gravels. In New Zealand and Australia and South America capitalists are taking hold of large deposits and bringing in water at considerable expense.

The promoters of all these enterprises turn to California for examples, and many of them are sending to California for engineers or practical hydraulic miners to assist in the work.

Foreign Capital.

It is fortunate that American mines are not in favor in London among those who take hold of properties for the sake of promotion fees and do not care what the result of the working of the mines shall be. As a consequence, those gentlemen who are given altogether too much to over-capitalizing go to other fields for bait for their prey, and there is very little heard nowadays of scandals on the London market in connection with mines located in the United States.

The reason for this is probably the fact that information in regard to nearly all the districts in this country is easily obtainable, and that it is difficult to float a mine upon a prospectus that does not state facts. It may be said that there is a disadvantage to us in this, in that it prevents the coming here of a great deal of capital; but, in answer to that, it can be said that it is much better for us that no capital shall be brought here or sent here at all unless it comes for the exploiting of legitimate enterprises.

During the past year or two a great deal of money has gone into Western Australia from London, and a large part of it into enterprises that will never return interest on the investment—much less the principal. It has been easy for the harpies on the London market, known as promoters, to carry out these schemes, because Western Australia is so new, and there is so little business connection between it and London that it is easy to present propositions without fear that the investors or others can obtain reliable information and expose them if they are not genuine.

In the colony of Victoria, where legitimate mining has been conducted for many years, the promoters find few properties to place on the London market; yet Victoria is not in want of capital, and can obtain all that is necessary without any blowing of trumpets for legitimate enterprises.

So it is with the United States. During the past year at least $50,000,000 has been invested quietly by English capitalists in this country, and the chances are that during the coming year much more will come in. Instead of sending out foreign engineers, they have employed Americans, well acquainted with the districts in which the proposed investments were to be made, and with the local conditions.

Americans in British Columbia.

The bill passed by Congress providing for restrictions on foreign immigration, with a clause prohibiting Canadians from coming over the line temporarily to work, is apt to cause some retaliatory legislation in British Columbia, unless the cooler heads interfere. At a meeting of American citizens at Rossland last week resolutions were sent to President Cleveland, protesting against the bill and asking him to veto it. They stated that there were 25,000 American citizens in British Columbia and many were heavily interested in the mining industry there.

At the regular meeting of the executive committee of the Northwest Mining Association last week resolutions were passed asking that the Mayors of various cities call mass meetings to pass resolutions urging legislation, both National and State, that will best serve to cement the friendly relations between the peoples on both sides of the line.

Altogether it looks as if the British Columbians will not act hastily in the matter, and, judging by the editorials published in their papers, they are more than desirous of doing all they can to continue the friendly relations that at present exist. One of them says:

If the Americans were preying upon Canada and carrying all their wealth over the border, the Canadian government would well occupy its time in seeking a remedy for such a great evil, but it is American capital that is assisting to develop Canada's resources; it is American brains that is building up her cities and American energy that is vitalizing her business enterprises. A great many of the Americans who are working in Canada are Canadians in all but name.

Concentrates.

A LARGE vein of copper ore is reported to have been discovered near Waldo, southern Oregon.

THE Goodwill tunnel at Cripple Creek, Colo., is being run at the rate of a little over 10 feet a day.

HURST & FOWLER propose to erect a 10-stamp mill on their mine at Harrison gulch, Shasta county.

A COMPANY has been organized in Paris, with a capital stock of $3,000,000, to develop the oil fields of Peru.

A NEW mining district, to be known as the O'Brien, has been formed in Secret Canyon, Kern county, Cal.

J. S. WILBUR and W. S. Peakes have arranged for the purchase of the Mammoth mine in Mariposa county, Cal.

D. LIGHTNER is preparing to erect a quartz mill in the Rodemacher mining district, twenty miles northwest of Garlock, Cal.

SALT LAKE capitalists are negotiating for the purchase of the onyx deposits recently discovered on the Brumeau, north of Elko, Nevada.

THE new railroad between Robson and Trail, in British Columbia, is being rapidly built, and is expected to run trains by the first of July.

THE French syndicate has concluded its purchase of 300,000 shares of the Elkton Consolidated mine at Cripple Creek, Colo., at $1 per share.

THE Rand Central Electric Works at Johannesburg, South Africa, with a capacity of 2000-horse power, supplies this power at the rate of about $220 per annum.

A NUMBER of men are employed developing a coal mine in Crum canyon, near Battle Mountain, Nevada. The vein shows 3 feet of coal, which is said to be of excellent quality.

THE Black Abro mine, at Dumont, was sold last week at Idaho Springs, Colorado, by W. H. Price to M. E. Smith, representing Eastern capitalists, for a price approximating $200,000.

IN the Frisco mine, Idaho, Manager MacDonald gives to each man working in the shaft a bonus of $1 a foot if 60 feet is made a month. If more than 60 feet is made he pays $25 for each additional foot.

BELOW the Comstock mines, in Nevada, several placer claims have recently been made along the course of the Washoe, on Galena creek, below the Ophir, and several other abandoned mill sites.

SOME chemists have under consideration a plan to save the sulphur from the fumes of the Butte, Montana, smelters, and begin the manufacture of chemicals, in which sulphur forms the principal ingredient.

THOMAS WALSH and Harold Wilson have obtained bonds on the Evergreen and Mayflower mines at Bingham, Utah, and are negotiating for others. It is proposed to erect matting plants to work the low-grade ores at Bingham and Ophir.

A SALE was made a few days ago of 4,000,000 pounds of Lake Superior copper wire at 11¾ cents for export to Germany, where electric railways are rapidly extending. Copper for twenty-eight railways in England is being contracted for.

A CABLEGRAM has been received from London by the Le Roi Mining Company of Rossland, British Columbia, making an offer for the property at the rate of about $4,000,000, with an agreement to place in deposit $100,000 as a guarantee of good faith.

A BILL has been introduced in the Idaho Legislature, providing that two-fifths of the gross output of the mines shall be assessed and taxed as any other property. As all improvements of the mines are now taxed, this would virtually mean double taxation.

EVERY mining journal published everywhere in every mining State says: "There is no part of the world to-day that offers better inducements for the investment of money in mining than right here in ——." And the best of it is that they all furnish excellent reasons for the assertion.

IN a recent decision the Supreme Court of British Columbia holds that under the coal mines regulation act it is illegal to employ Chinamen in underground coal mining. An effort will be made at this session of Parliament to pass a law extending the same rule to all classes of underground mining.

THE St. Elmo Mining and Water Company, who own the St. Elmo mine in the Randsburg district, Kern county, California, propose to sink a shaft 500 feet deep on the property. Nothing will do more for the whole district than the sinking a few deep shafts to determine the value of the mines in depth.

THE great depth to which mines in Victoria, Australia, have been worked says much for the future of mining in that colony. In the Lazarus a shaft is down 3185 feet; in the New Chum United, 2892 feet; New Chum Consolidated, 3099 feet; Garibaldi, 2720 feet; Shamrock, 2764 feet—and so on through a long list.

IN January the copper product of the United States was about 39,500,000 pounds, the same amount as was produced in December, while foreign mines produced only 14,784,000 pounds, a decrease of 2,664,000 pounds. It is no wonder, then, that foreign capitalists are so eagerly seeking copper deposits in this country.

THE London *Mining Journal* gives a list of quartz and gravel mines of Victoria, Australia, fifty in number which have paid in dividends over £20,000,000, most of them are yet in operation. Taking the total product of Victorian mines at £250,000,000 it is estimated that there has been paid in dividends from this no less than £80,000,000.

THE State of Nevada has received in grants from the United States Government 2,455,860 acres of land, and there is yet due from the same source 277,212 acres. Of this 90,000 is an agricultural college grant, and 46,080 a university grant. Of the lands granted a large acreage has been turned over by the State for the establishment of a mining college.

THE Surveyor-General of Nevada, in his annual report, speaking of the question whether Nevada is not a gold rather than silver-producing State, says that the increase in production of gold and silver combined in 1896 over 1895 was $1,121,499. This was all due to the increase in gold production, for the silver production fell off from $1,051,992 in 1895 to $988,555 in 1896.

THE United States Debris Commission has granted permits to hydraulic to A. F. Roberts, of Forbestown, Butte county, Cal.; to Gray & Taylor, for the Sugar Loaf mine, near Colfax, Cal. The owners of the Tippecanoe mine, near Camptonville, Yuba county, Cal., and the owners of the Kentucky Slab mine, in El Dorado county, Cal., have been authorized to reopen their mines.

THERE are some marvelous growths recorded in this part of the world, but probably the most remarkable of late is the growth of a tale in traveling from Costa Rica to Wyoming. When it reached Laramie it was to the effect that one McGregor had discovered a ledge in the Central American republic with gold quartz that assayed $240,000 to the ton, or about 60 per cent gold.

PROSPECTING with plows is the latest innovation in mining, and was introduced a few days ago by Whelpley and Mamby, in what is known as the "Stringer" district, near Randsburg, Cal. They used a large plow with eight horses, and plowed furrows across their ground. The soil is a decomposed granite, and by crossing two or three times in each place were enabled to uncover several stringers.

HARRY JOHNSON, an extensive stock raiser in Lower California, has for the past three years been digging a ditch to convey water from half a dozen big springs on the slope of San Pedro Martir to extensive placer diggings at Socorro, a distance of eighteen miles. The placer ground is sixty miles east of Colnett and Mr. Johnson has a Government patent for thirty-two claims, or about eighty acres of ground.

THE mineral land bill is dead—done to death according to programme. This paper hoped to be able long before this to chronicle its success. Many columns were published herein in its favor, and considerable honest effort was made in behalf of the best interests of the commonwealth, which required the passage of so just a measure. Those who killed the bill should have their reward. They certainly earned it.

IT is reported from Ottawa, Canada, that the Government will probably pass a bill providing for the construction of the proposed Crow's Nest Pass Railway and its continuation as far as the coast. This, with the roads now built or arranged for, will do much toward developing the mining districts rapidly and bringing down the cost of working ores, so that much of a grade too low to be worked under present conditions may be handled.

WILLIAM SKEY, analyst to the Home Department of New Zealand, writes that he has found while engaged as an expert in a government case that aqueous solutions of cyanogen do not exert the least solvent action on gold or silver. Of course as the gas decomposes there is a slight solvent action, but even this is far too slow and destructive of the gas to make extraction of gold a commercial success. This must prove to be interesting to cyanide men.

HIRAM S. MAXIM, the great gun maker, has patented an improved process for extracting gold from refractory ores. He takes advantage of the affinity existing between gold and lead, when both are at a high temperature, and subjects the ore to the action of molten lead in the presence of a reducing gas or atmosphere. Whilst in the presence of a reducing gas or atmosphere the ore and molten lead are pounded, and the mass is slowly rotated or stirred.

IT is understood that the Exploration Company of London has closed a deal for the purchase of the Santa Rita copper mine near Silver City, New Mexico, for $1,500,000. The mine was largely owned by J. Parker Whitney of Boston, and was extensively worked during the Spanish occupation of the country, and the legends of the locality are to the effect that it was the deposit from which the ancient inhabitants used to secure the copper for their weapons.

AT the annual meeting of the Old Dominion Mining and Concentrating Company in Seattle, Washington, which has recently been incorporated for $5,000,000, G. B. Dennis, president of the Northwest Mining Association, was elected president. The company owns 53 claims in the Colville district, and probably has more development work done than any other company in the Northwest. The tunnel at the lower level is in over 3000 feet. At this meeting it was decided to push the tunnel another 2000 feet on the ledge.

THE output of the mines of Victoria, Australia, last year was about $15,000,000, as against about $5,500,000 for West Australia. Yet English capital is much more interested in the latter than in the former, and while but little money has been invested in Victoria by London people, during the past year immense sums have been paid out for development in West Australia. The reason for this is not that there is more faith on the part of the English promoter in West Australian mines, but that there is more room for speculation.

THERE is a bill before the Utah Legislature providing for a State Mine Inspector, and last week the Salt Lake *Tribune* published interviews with a number of the leading miners as to the bill. A large majority of them said that the value of the bill would depend entirely on whether a good man is appointed, and many of them expressed a fear that a mistake in this direction might be made. That is the trouble in all the States. Until all such appointments are made for merit, and not for political reasons, the passage of more such laws will be of questionable value.

AT a meeting of the shareholders of the Golden Feather, limited, held in London, it was decided to reconstruct the company in order to raise more capital to go on with the work in their mines in Butte county, California. It was stated that they had been deceived into working over old ground during the past season. The chairman stated that had they begun where they have now worked to this step would not have been necessary. During the past year 2000 feet of the river bed had been worked, and there remain in the claims about 5000 feet which is virgin ground.

DURING the past six months a number of companies have been organized by Eastern capital, largely to operate extensive gravel deposits in Wyoming and Northwestern Colorado. Last week at Rockdale, Wyoming, a company was formed to work 5000 acres of placer ground near that place. A contract has been let for the building of a ditch seven miles long, 12 feet wide at the top and 8 feet at the bottom, with a depth of 4 feet. Its cost is placed at $11,000. In this case, as with most of the ditching in that country, nearly all the work will be done with plows and scrapers.

IN Washington, on the Similkameen river, a novel method of mining gravel has been inaugurated. Last year there was built at Wenatchee a stern-wheel steamer, fitted up with the appliances, including pumps capable of handling 150 cubic yards of gravel per hour pumped from the bed of the river. The hose from these can take up a boulder 6½ inches in size from a depth of 50 feet to a height of over 20 feet above the water level. All of the material passes through a grizzly and the larger rock is thrown back, and that which passes through the grizzly is treated much as in ordinary sluice-box mining.

IT has been announced from Washington that the south half of the Colville reservation will be thrown open July 1. The Spokane papers are advocating the taking of steps to keep out the "sooners" in order that an equal chance be given to all. The *Spokesman-Review* says: "But it will be difficult to keep "sooners" off the forbidden ground until that date. In dealing with this problem the Government should either make a thorough effort to keep off the invaders, or no effort at all, leaving to all the opportunity to prospect the new ground and be prepared to make locations on July 1. Justice requires that all or none be excluded."

IN the case of Parsons vs. Mix, from Cripple Creek, Colo., the Secretary of the Interior has ruled that all advertisements for patent that do not give the book and page of the records in the clerk's and recorder's office at which the location or amended location certificate can be found, are defective, and all such must be republished. This it is claimed will make it necessary to advertise again all those claims which have been advertised in Cripple Creek during 1896. The trouble has grown out of the fact that the claim owners have made contracts at low rates with surveyors, who, to save money, also acted as attorneys.

THE importation of lead ores from British Columbia to American smelters is apt to cut some figure with the Committee on Ways and Means at the next session of Congress in framing a tariff. In case the increase proposed is insisted upon, although a majority of the mines are owned by people on this side of the line, it is claimed that they will do all their smelting in Canada. The great bodies of ore that are developed, the coal resources they have close at hand, and the different varieties of ore that are and will no doubt continue to be found, will make it impossible to do their own smelting and refining and have all the profits that accrue therefrom.

CORNISH tin mining must be in a bad way according to the Westminster (London) *Gazette*, which says that the depression in the mining districts of Cornwall has reached an acute stage. The price of tin has been gradually dropping for many months past, and it is now lower than it has been for nearly twenty years. Consequently miners are leaving the country in thousands. Since January last over 1000 miners from the districts of Camborne and Redruth alone have emigrated to South Africa and other colonies. In fact, Cornwall is fast losing the best of its brain and muscle. Last year no less than 2086 Cornishmen left the country for South Africa alone.

ON the Carson river, in Nevada, the tailings from the Comstock have been for some time receiving the attention of the Carson River Placer Mining and Dredging Company. The dredgers have worked satisfactorily enough, and the supply of material containing values in gold and silver is almost inexhaustible, but being composed of the tailings from over a hundred different mines are of a base and complicated nature, and it is no easy matter to decide upon a process for working them. Herman Davis of Dayton, Nevada, has begun the construction of a leaching plant of fifty tons capacity at that place, and the dredging company have an option for its purchase if satisfied with its work. About the first of March they will have made some changes in their machinery and begin screening material from their claims on the Carson river, to be worked in the leaching plant.

IT is reported that the Clondyke placers, on the Yukon, have been found to lie on the British side of the line, and that the miners, both American citizens and British subjects, hail this with delight. The Alaska *Searchlight* says: "For years the Yukon has been a large gold-producing region, but not one dollar has our Government expended in building trails or assisting miners in any way. All it has ever done has been to give these people Deputy Collectors of Internal Revenue and Customs, and a poor mail service one season. Now there is to be a radical change. The Canadian Government will doubtless pursue its wise and liberal policy, build trails, provide courts, etc. It is a lamentable fact, but nevertheless true, that the Yukoners, before another year has rolled around, will sing 'God Save the Queen' more heartily than ever they sang 'My Country, 'Tis of Thee.'"

IN 1880 the Government, under an act of Congress, reserved a number of large reservoir sites in the arid regions of the United States, and also reserved from settlement almost all the lands that could be irrigated from such reservoirs. The people of the West protested vigorously against the withdrawal of the lands from entry, and in 1890 Congress restored the lands to settlement and reserved only the reservoir sites. A bill passed last week by the House authorizes the State and private individuals or companies to use and occupy these sites for the purpose of storing water to be used for irrigation under such regulations as the respective States may prescribe. There has been reserved by the Government 138 reservoir sites, thirty-five of which are located in Colorado, twenty-three in California, thirty in Montana, nineteen in New Mexico and thirteen in Utah. This bill permits these sites to be used only for reservoir purposes, under the act of Congress of 1891, which provides that maps showing the contemplated improvement shall be filed in the Interior Department and approved by the Secretary of the Interior, and that the work of construction shall be commenced in good faith in one year and finished in five years.

THE American Institute of Mining Engineers held its seventy-second meeting in Chicago last week, E. G. Spilsbury presiding. Biographical sketches of Joseph D. Weeks and Alexander Tripple were read. Among the papers read were the following: "The Distribution of the Precious Metals and Impurities in Copper," by Edward Keller, Baltimore, Md.; "The Precipitation of Gold by Zinc Threads from Dilute and Foul Cyanide Solution," by Alfred James, Glasgow, Scotland; "Sorting Before Sizing," by R. H. Richards, Boston, Mass.; "The Chicago Drainage Canal," by J. F. Lewis, Chicago, Ill.; "Influence of the Metalloids (Sulphur, Phosphorus and Silicon) in Cast Iron," by Guy R. Johnson, Embreville, Tenn.; "The Genesis of Auriferous Lodes from a Chemical Point of View," by Prof. John R. Don, Dunedin, New Zealand; "Direct Generation of Electricity from Carbon," by R. H. Sanders and H. M. Chance, Philadelphia, Pa.; "Mining Methods in Northern Minnesota," by Prof. F. W. Denton, Minneapolis, Minn.; "Discussion of Prof. Christy's Paper on the Solution and Precipitation of the Cyanide of Gold," by Alfred James, Glasgow, Scotland; "The Hand Auger and Hand Drill in Prospecting Work," by Charles Catlett, Staunton, Va.

Ditch Construction in Idaho.

Written for the MINING AND SCIENTIFIC PRESS by AUGUSTUS J. BOWIE, Consulting Engineer.

Leesburg mining district, in Lemhi county, Idaho, has, since its discovery, been noted for the production of its gold placers. Situated in the heart of rugged mountains, until the last two years it has been practically inaccessible. The greatest part of this region is drained by Napias creek, which receives the waters from tributary creeks as well as from rains and melting snow from the surrounding mountains. These topographical conditions necessarily cause heavy floods during periods of warm weather and rain, when its discharge at California Bar has been as high as 700 cubic feet per second.

The California Bar claims are situated in Napias creek, about three miles south of the town of Leesburg, and below the principal tributaries of Napias creek.

In the fall of 1892 some Colorado speculators prospected these claims and in the spring of 1893 determined to hydraulic them. Early in the sixties attempts had been made to bottom this channel, and in one instance $60,000 was lost in endeavoring to reach it by means of a tunnel. Chinese subsequently leased the ground, and thinking that they could control the surplus water and drift the gravel, constructed along the west side of the creek bed a canal about two and one-half miles in length. The enterprise was a failure, but the property maintained its reputation for richness, although its opening was considered by all in these regions an impossible feat. An examination showed, however, that it was perfectly feasible, although the grade for the sluices was only 1.55 per cent.

The bar claims referred to approximate 4500 feet in length by 300 to 800 feet in width of the creek bed, contracting at the upper as well as at the lower end. Alluvions occur on the west side of it, but none on the east. The depth of the deposit in the creek bed demonstrated by prospecting shafts was 57 feet at the lowest end and 18 feet at the upper. The bedrock is a metamorphosed rhyolite. The creek bed has been tailed through for years and contains a large amount of sand and refuse material covering a gold-bearing gravel deposit which lies on bedrock.

The early miners ran a little ditch from Napias creek, above Rapp's creek, which delivered a few hundred inches of water at the lower end of the bar under a pressure of 100 feet. The ditch was practically of no value, and a larger one was therefore projected for hydraulic mining purposes. The new line was surveyed and located to draw the water directly from Napias creek, about a mile above Rapp's creek. Work was started in October, 1894, on the line, but extreme cold weather and snow closed the operations. In the latter part of May, 1895, instructions were given to push the work and complete it. Between 1894 and 1895 considerable information was gathered as to the discharge of this water-shed, and it had become very apparent that any ditch with its head in this portion of Napias creek would in all probability be destroyed in times of flood. Moreover, it was noticed that the flow of water from Rapp's creek was more desirable and as continuous as that from Napias creek, and, should there be only this one source of supply for both ditches, mining operations were liable to be indefinitely suspended during the water season. Rapp's creek was selected for the location of the head of the new ditch, necessitating a total change of plan and the construction of 3400 feet of flume and trestle work. On account of the steep rise of the hills, there are no available sites for storage reservoirs in the vicinity of California Bar.

A distributing reservoir can be constructed about a mile above the present head of the new ditch, which would impound a few weeks' water for mining during the dry season. The capacity of the new ditch and that of the old ditch (enlarged to carry 1500 inches of water), with the assistance of the China ditch to handle the surplus water, beyond the head of the sluices, will enable very extensive mining operations to be carried on during the entire water season, and, should developments justify it, a larger supply can be obtained.

Details and Cost of Construction of Rapp's Creek Ditch and Flume.—This work was constructed in the summer and fall of 1895 by the Leesburg Gold Mining and Milling Company, Limited, to supply water for the mining operations at California Bar, Lemhi county, Idaho. The line was surveyed in July, 1892, and staked in the fall of 1893. Preliminary work for the purpose of estimates was carried on spasmodically during 1893–4 up to May, 1895.

The following table shows the total expenditure from October 1st, 1894, to May 23rd, 1895 :

Labor clearing out stumps and grading	$1059.77
Team work	426.87
Powder, caps and fuse	41.87
Tools	12.35
Total	$1540.86

All this work was at the rate of $3 per diem for labor.

The ditch (see annexed drawing) is 7 feet wide on top, 4 feet on bottom, and 3½ feet deep. In its construction the bank was cut horizontally from the grade stakes a distance of from 13 to 15 feet. The outside bank of the ditch is 3 feet wide on top in solid ground. The side slopes along the mountain are exceedingly steep, and in places composed solely of debris, making ditching impossible. On all the curves the ditch is enlarged from 1 foot to 1½ feet in the bottom, with a corresponding increase on top. The material from the excavation was placed on the outer bank and sloped back to prevent any sliding into the ditch. After the ground is thoroughly soaked, caulked and consolidated, the carrying capacity of the ditch can be readily increased 1 foot in depth.

In the rock cuts, through a species of rhyolite, badly fissured, boxes have been placed wherever it was deemed necessary. In constructing the ditch, besides manual labor, teams with plows, go-devils and scrapers were employed. This is a new departure in mining work, but has been most successfully used even on the steepest side hill.

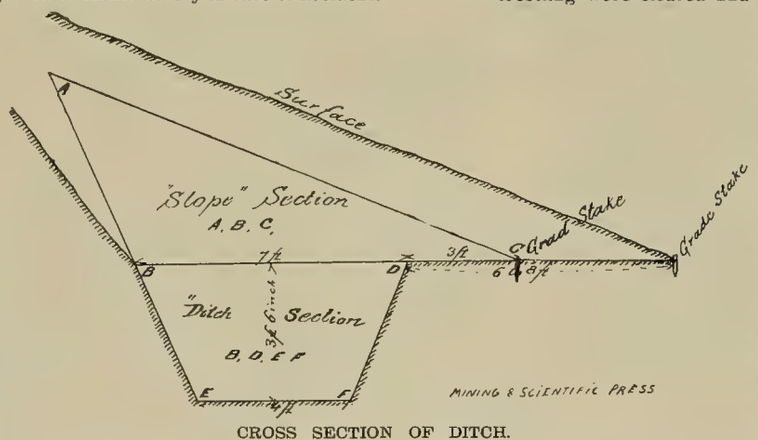
After the grade pegs were set, an outside stake 3 or 4 feet high was placed immediately opposite to them, so that the former could be readily found. The first furrow was started from 4 to 6 feet inside the grade peg. The ground was then graded for a width of 12 to 13 feet, according to circumstances, to a level with the top of the grade. In a word, a road was built by excavating the side hill on the grade of the ditch.

As each stretch of road was completed, a team with a plow was set to work about 4½ feet inside the grade peg, plowing the ground the top width of the ditch. A team with a go-devil with an adjustable side followed the plow, removing the ground broken. As the work progressed, the go-devils were abandoned and scrapers used. In their employment great care was necessitated in seeing that the outside bank remained intact and was not damaged by the teams. To insure against such accidents, where the teams entered and left the ditch the ground was gently sloped and left solid. The excavated material was taken out one end and deposited along the top and side of the outer bank, where it was tramped down by the teams as they returned to enter the ditch.

Teams were used to within a foot of the bottom of the ditch, from which point the ground was worked down with pick and shovel to grade, and the sides properly sloped. The grade of the ditch is 10.5 feet per mile.

Blasting as far as possible was avoided. The greater part of the work was done with picks, gads, sledges and crowbars. The outer bank has been kept practically intact, great care being taken not to have it shattered. The removal of heavy boulders was effected by means of powder (giant), but most carefully applied in very small quantities. The rhyolite rock through which the ditch runs, although compact, is somewhat disintegrated on the surface, but badly fissured. It was readily handled with the assistance of sledges and gads.

There are five waste ways, but two more are projected to insure safety in case of accident.



CROSS SECTION OF DITCH.

The dotted line shows a section of the ditch with the bank cut 10 feet horizontally from grade stake. Solid lines indicate the section as actually constructed with the bank 13 to 15 feet from the stakes and sloped back further than the dotted line figure. The area inclosed in the solid lines was used in calculating the number of cubic yards excavated, but no allowance has been made for the extra amount of ground removed in giving the inner bank its greater slope, as required in the general construction of the work.

The volume of earth removed was calculated from slopes taken every 50 feet along the line of the original survey.

The total length of the line from the measuring box at California Bar to the head of the ditch at Rapp's creek is 15,105 feet, segregated as follows:

	Feet.
Ditching	11,633
Fluming	3,472
Total	15,105

	Cubic Yards.
Earth and solid ground removed	20,456.25
Rock removed	4,134.16
Rock removed for flume bled	552.27
Total	25,142.68

Of this there were :

	Cubic Yards.
In the ditch section	7,748.90
Slope section	16,841.51
Flume bed	552.27
Total	25,142.68

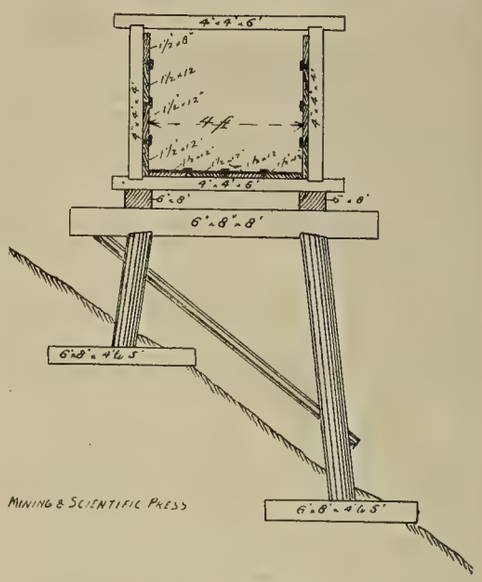
The total cost of the construction of the ditch, including labor, side-lining and ditch at head-gate was $10,309.86, segregated:

Labor and material	$ 9,448 28
Lining (materials, labor)	805 33
Head ditch	56 25
Total	$10,309 86

Exclusive of the ditch lining, but including the proportionate charge for superintendence, the cost of this work is as follows :

Labor, etc	$9,448 28
Superintendence	365 00
Total	$9,813 28

Trestle Work.—The timber for the trestle was hewn from spruce trees on the hillside above the line of construction. The character of the ground over which this work was constructed precluded any possibility of ditching. It was hazardous to break the



FLUME AND TRESTLE.

steep hill slopes any further than was absolutely necessary to anchor in the posts and sills. The trees and brush for 40 feet above and below this trestling were cleared and burned to protect the flume against accident and fire. Stumps on the upper hillsides are numerous, and a few small poles placed against them parallel with the trestle will afford protection against rolling rocks, while the many growing trees higher up give the best security against snowslides.

The average height of the inner posts approximates 3 feet, and the outer posts average about 6 feet, both being 7 inches in diameter. The posts are stripped of their bark, and set on sills of hewn timber 6 x 8 inches, with a length corresponding to the requirement. On the inner side only sufficient ground was excavated to permit the placing of a 3 or 4-foot sill, as might be necessitated. The outer post is set on a sill securely placed on the ground purposely excavated and leveled for it. A slope of 1½ inches to the foot is given to the posts, which are nailed to the sills with 60-penny nails. The caps are fitted with a gain to each post and nailed on both sides. The stringers (each 18 feet long) of 6 x 8-inch timber are hewn on both sides, gained on the lower side to the caps, and notched where they are nailed to them. They lap on both ends over every three bents. The bents are placed 8 feet from centers, and are braced crossways with 3 and 4-inch diameter round poles, spiked to the post caps. The structure is so strong as not to require any longitudinal bracing.

This particular piece of trestle work was commenced July 15th, 1895, and finished August 15th, 1895. The total number of hands employed was thirteen, and the entire cost, including labor, timber, tools and nails, aggregated $1109.69.

The drawing shows the construction of the flume

and trestle in detail, and the table gives the respective amount of timber each contains :*

	Feet, Board Measure.
Posts—7 in. diam. by 6 ft. by 3 ft.	10,395
Caps—8 ft. by 6 ft. by 8 in	12,330
Sills—8 ft. by 6 in. by 8 in	12,330
Stringers—18 ft. by 6 in. by 8 in.	27,930
Total	62,955

The lumber for the flume was cut at the company's sawmill, about three miles by wagon road from the present head of the ditch. It is a red fir of ordinary quality, such as is usually found in this country. The logs were cut during the fall and winter of 1894, and were fairly seasoned but somewhat checked. On account of the scarcity of ready material, about one-half of the caps on the flume were made of two pieces of 2 in. x 4 in. scantling, spiked together and then gained. All lumber used in the ditch and flume construction has been charged for at the rate of $14.05 per M., the mill charge. The greater part of the lumber had been culled over and the best planks selected for the sluices.

The flume at the head below the main gates is 6 feet wide and 4 feet deep. This size runs for a distance of 150 feet, tapering into a 5-foot sluice 4 feet deep, running a similar distance and tapering into the regular size flume as given in annexed table. The lumber, sawed but not planed, was carefully put together, all joints being closely battened. The posts were gained 1 inch into the sills and caps, respectively, and nailed. No side braces were used on the flume.

TABLE OF FLUME.

Flume 4 feet wide, 42½ inches deep, 12-foot box.	
6 posts 4 inches x 4 inches x 4 feet	32 feet.
3 caps 4 inches x 4 inches x 6 feet	24 "
3 sills 4 inches x 4 inches x 6 feet	24 "
4 bottom planks 1½ inches x 12 inches x 12 feet	72 "
6 sides 1½ inches x 12 inches x 12 feet	108 "
2 sides 1½ inches x 8 inches x 12 feet	24 "
9 battens 1½ inches x 4 inches x 12 feet	36 "
Total	320 feet.

Hauling and delivering of material at the head of the ditch was done by contract. Whenever the company's men or teams were employed on the ditch construction the ruling rates have also been charged to this account. As the flume progressed the lumber was floated to the work as required.

Labor rates were as follows:

Laborers	$2.50 per diem, 10 hours work.
Carpenters	$3.50–$3.25 " " "
Teamsters	$2 50 " " "
Two-horse team	$3.00 " " "

Teamsters supplied plows and scrapers, did their blacksmithing and furnished their own horse feed. All the men were boarded by the company's contractor at the rate of $1 per day per man, the company receiving 10% on all accounts. No credit for profits has been given in any statement of costs.

COST OF FLUME.

Labor	$ 879 50
Lumber	1,202 03
Hauling	191 23
Tools	7 66
Nails	176 00
Superintendence	125 00
Total	$2,581 42

The total amount of lumber charged above is 85,534 feet, B.M. In the side lining and intermediate boxes between the main flume and measuring box there have been used 23,769 feet B. M. lumber (additional). The details of this cost will be found in the final table.

The pressure box, measuring box and wasteway from pressure box contain 12,015 feet lumber. The sand box connects the measuring box with the pressure box, which latter is protected from overflow by means of a waste way. The measuring box has sufficient capacity to gauge 3000 miner's inches and can be increased should it be found desirable. The details of cost are given in the final table.

In the gates and boxes at the head of the ditch 3310 feet of lumber were used. Four small timber-cribbed dams (loaded with rocks), 4 x 6 feet in size, angling up stream, sunk 3½ feet and 4 feet high above creek bottom, hold the gates through which the water supply from Rapp's creek is drawn. There is a temporary obstruction thrown across the bed of the channel of Rapp's creek to direct the water into the ditch. The gates at the head are provided with a wasteway 10 feet wide, alongside of them, so as to regulate the height of the water entering the ditch. To thoroughly protect the flume from being destroyed by an overflow of the creek, or back water, another set of gates and wasteway have been placed about 50 feet below the main head gates, firmly set in the ditch on a bluff of rocks. The main flume, several hundred feet below the head, has been fitted with a large sand box, 48 feet long.

The cost of tools in the construction of this ditch and flume, as shown in the final statement, is insignificant. This is due to the fact that the plows, scrapers and go-devils were supplied by the men owning the teams, and the company had on hand a supply of tools left over after the building of the Leesburg road. Hence the only charge is for material consumed and a few necessary articles purchased.

The entire ditch and flume were completed and water delivered at the mine September 29th, 1895. The ditch will bear comparison with any first-class mining work of this character. The actual cost per cubic yard of material used was 46.2* cents ; the cost of 388 linear feet of lining, including material, was $2.07 per foot ; the cost of the flume per linear foot was 83.7 cents ; the cost of the trestle per linear foot was 35.9 cents ; the total cost of the entire work aggregated $5799.30 per mile, including superintendence, surveying, measuring box, pressure box, wasteways, head gates, cribs, etc., and all moneys expended from May, 1893, to May, 1895, which is materially less than any similar size structure built on the west coast in the mining region with the same rate of labor.

* Exclusive of braces.

* The cost per cubic yard as per tabulated statement is 39.9 cents. In this is properly chargeable all expenditures prior to May, 1895, which aggregate $1540.80, making total cost 46 2 cents per cubic yard

Outline of the Geology of California with Reference to Its Mineral Deposits.

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS by HAROLD W. FAIRBANKS, Ph. D.

The most important geological revolution of which we have any record took place along the Pacific coast of North America at the close of Jurassic time. The sedimentary rocks in the Klamath mountains, the Sierra Nevadas and probably the great region to the south and east were folded together and involved in enormous masses of molten granite and lifted above the sea. The granite mountains before referred to had long existed along the axis of the Coast Ranges, and there no melted granite core was formed as far as we know; but they were uplifted to proportions perhaps comparable with those of the present day.

The next younger geological period which we recognize is the Cretaceous; but before the land again sank so as to permit sediments of that age to be laid down, hundreds of thousands of years may have elapsed during which the great gold and silver deposits of the State were formed. Considered from an economic standpoint, this period of mineralization has been the one great event in the ancient history of California.

After the granite had been squeezed into the sedimentary rocks, upturning and breaking them, this extensive region remained heated for a long time. As it cooled off, the mountain, making movements, again fractured the rocks, permitting the waters falling upon the surface to penetrate and circulate to great depths where they became heated through contact with the still hot and, perhaps in places, molten rocks. It may be that there were also other subterranean waters derived from different sources in addition to those derived directly from the surface.

Hot waters are capable of dissolving out various rock constituents, and after becoming impregnated with the alkalies are all the more effective in their action upon rock material. Many, if not most, of the rarer metallic elements are sparingly disseminated in almost all rocks, occurring possibly in many cases in greater amount as the depth increases. Many of these minerals were dissolved out by the hot waters which percolated through the fissures, and under favorable conditions issued upon the surface. As the waters began to cool and exist under less pressure in their upward course, various constituents were precipitated, the process resulting finally in the mineral veins which we now see exposed.

The mineral deposits along the western coast of North America are not sporadic, but are found thickly scattered over almost the whole of the great region where had occurred the violent geological disturbances already described, and we must conclude that their deposition was directly due to these disturbances. It is possible that the intensity of the mineralization bears a direct ratio to the amount of fusion and breaking up of the crust and subsequent fissuring. In the Coast Ranges, south of the Klamath mountains, there were no granitic outbursts at this time; and notwithstanding the fact that the rocks are much fissured and broken, there are no very important gold deposits, although gold does occur in small amount at many places, more particularly in the Cruickshank district in Monterey county.

The whole western border of North and South America is characterized by its mineral richness and its proportionate extreme geological complexity, and we must come to the conclusion that they are related to each other as cause and effect. It is, however, remarkable that many extensive volcanic outbursts are not associated with any mineral veins, as we notice in the case of the great lava beds of the northwest. It has also been noted that granite and other acid rocks (those rich in silica) contain gold as an original constituent, while the basic rocks (those poor in silica), such as basalts which form so large a proportion of many recent flows, do not contain it as far as we know.

It may be that in a disturbed volcanic district, when waters penetrate to the hot regions below, they have a greater opportunity to become enriched if they pass through granitic rocks which we suppose contain more disseminated gold than the basaltic rocks. As far as we know, granite underlies the auriferous slate series through the main gold belt, and it is also known that the granitic region of eastern California is rich in gold-bearing veins. The gold on the western slope of the Sierras was undoubtedly derived from sources underlying the slates and dikes so abundant on the surface.

As the Cretaceous period which follows the time of this important mineralizing action contains almost no gold (the exception will be noted later), there is good reason for believing that the innumerable gold and silver veins date from the time of the flow of the innumerable hot springs subsequent upon the granitic intrusion.

Although it is probable that the Sierra Nevadas and Coast Ranges existed as mountain elevations at that time, we must not suppose that the country had much of the appearance which it had to-day. It must be borne in mind that since the mineral deposits were formed, thousands of feet in thickness of disintegrated rock have been removed from the mountains and deposited in the deeper valleys and along the ocean shores, while immense mountain blocks have been elevated and depressed, through the formation of fissures on one side and subsequent tilting. Movements along these great fissures are frequently taking place to-day in Owen's valley on the eastern side of the Sierra Nevadas and in many other places in the State. Think for a moment how thickly the quartz veins, generally gold-bearing, are scattered the whole length of California in all kinds of rocks and in all positions, bearing in mind the probable conditions under which they were formed, and we are in a position to understand the incorrectness of much that is written upon prospecting and the occurrence of ore deposits in general.

We trace the original conditions for ore deposition to subterranean disturbances and probably the formation of molten rock masses. Following this there are hot mineral-bearing springs depositing the minerals carried in solution along the fissures in the rocks through which the waters pass. Now these fissures and the suitable chemical conditions for deposition may occur in any kind of rock and anywhere in the region where geological disturbances have occurred and have been followed by mineral springs, but they are more liable to occur in greater number and size where the fissure systems are numerous and regular. If, in addition, the strata have been evenly tilted and are cut by dikes of intrusive rock running in a direction parallel to the stratification, we have exceptionally good conditions for the formation of veins on a great scale. These conditions are all fulfilled on the main gold belt in California, and particularly along the mother lode, which in respect to the regularity of the upturned sedimentary strata, the associated dikes and great ore deposits cannot be equaled in the world. Not only have the dikes been intruded generally parallel to the stratification, but the fissure systems have also been formed along nearly the same lines. The regularity of the mother lode is thus seen to be due to fortunate geological conditions. The Mariposa beds, the sedimentary portion of which consists largely of slate, are the youngest of the auriferous slate series, and at the time of the granite intrusion were evenly and regularly folded. The diabase dikes known as greenstone are in part ancient volcanic flows, and in part fragmental volcanic rocks. It seems more than probable, judging from the character which is maintained by the ore bodies in the deepest workings, that they will continue beyond the greatest depth at which they can be worked profitably.

(To be Continued.)

LEESBURG GOLD MINING AND MILLING COMPANY—CONSTRUCTION OF RAPP'S CREEK DITCH.

	Grading and Excavating Ditch.	Trestle.	Main Flume on Trestle, Two Switches, 257 Boxes.	Pressure Box, Measuring Box, and Wasteway.	Side Lining and Intermediate Boxes Between Main Flume Measuring Box.	Gates, Boxes, etc.	Roads and Trails.	Totals.
Labor	$ 7,647.72	$1,051.00	$879.50	$148.18	$347.69	$30.00	$67.25	$10,171.34
Foreman	365.00		125.00		70.00	5.00		565.00
Surveying	162.00							162.00
Grading (teams)	1,728.87							1,728.87
Hauling lumber			191.23	9.00	24.00	8.00		232.23
Tools, steel, iron and coal	94.85	3.79	7.66					106.30
Powder, caps and fuse	33.09							33.09
Nails (51½ kegs)		54.90	176.00	29.13	29.69	6.27		295.99
Lumber (124,638 ft. at $14.05)			1,202.03	168.91	333.95	46.37		1,751.16
Totals	$10,031.53	$1,109.69	$2,581.42	$355.12	$805.33	$95.64	$67 25	$15,045.98

Lumber used in flume and trestle, 85,544 feet; in pressure and measuring boxes, 9,090 feet; in wasteways, 2,925 feet; in side lining and intermediate boxes, 23,769 feet; in gates and boxes, 3,310 feet; total lumber used, 124,638 feet. Timber in trestle reduced to B. M., 62,955 feet, is included in total cost of trestle under labor account, which represents the cost of hewing and setting, and also the excavation of 552.27 cubic yards of rock.

Mining Summary.

CALIFORNIA.

Butte.

Register: P. M. Dodge & Co. are opening a new gravel mine west of Oroville. A ditch is being cut for mining purposes. It is proposed to handle the gravel with teams and scrapers and then wash it for the gold. Five or six men are employed.

The Jim and Jack mine, near Pentz, is having a large bedrock tunnel driven upon it.

At Enterprise at least nine or ten mines will be in operation this spring.

The rock in the Red Point mine is soft, so the men are making excellent headway in the tunnel. It is believed that by the first of next month the ledge will be tapped, when it is the intention of the owners of the mine to erect a quartz mill, with a capacity of 20 stamps, to be run by water power.

Parties have taken hold of the Carlisle mine, and it is said that a new road will be at once constructed from the end of the Slater road up to the Carlisle property. The mill is almost completed, so that ten days' work will put everything in running order in the plant.

Dave Burroughs will start up the Bullion mill and push work on the mine within a few days.

It is said that work will be shortly resumed upon the Carlisle quartz mine.

Josiah Champion struck very good gravel near the old quartz mill in Price's ravine. Coarse gold has been taken out from a side ravine for many years in the winter season when there was water to work. Now Mr. Champion has water from the Forbestown ditch to work with.

Calaveras.

Prospect: From present indications next spring and summer will show a greater activity in mining in this county than was ever before seen, and even now with the fearful condition of the roads, machinery and lumber is almost daily being hauled in for the development of our mining properties. Work on the electric power plant on the Mokelumne river, near Mokelumne Hill, still goes on and by May or June it is expected that the company will have completed every arrangement to furnish cheap power throughout the county to all those desiring it. The California Exploration Company has at Valley Spring, awaiting the better condition of the roads for transportation, 900 poles for electric wires, each 25 feet long, 12x12 at bottom and 6x6 at top, one carload of wire and ten tons of insulators, besides a large quantity of lumber which has already been hauled to their mines at different points.

At Murphys the McQuig mine, known as the May Day, is being worked systematically. A small mill has been built and will be in operation soon.

The Carley mine has been producing some good ore. Their mill is in readiness and crushing can be commenced any day.

The report is current that the Geo. Taylor mine on Six Mile creek is under negotiation and may be operated by San Francisco companies.

El Dorado.

(Special Correspondence).—G. S. Estey, at Indian Diggings, is running a tunnel through a gravel bed. His objective point is the channel bottom. The tunnel is in 500 feet. He has been taking above $3 per day from the excavation.

The Pyramid mine, nine miles southwest of Placerville, has been bonded to a Scotch syndicate for $100,000, of which $40,000 are to be paid in 30 days, the balance within a year.

Dixon & Morton have sold their mining claim at Greenwood to Chicago parties, who begin extensive development work immediately.

The shaft on the Ohio mine, near Greenwood, has reached 300 feet. Superintendent Keeny is well pleased with the outlook of the property. It is owned by San Francisco parties. The Greenwood section is slowly but substantially advancing in the mining field.

The tunnel on the west end of the Lloyd property, adjoining the town of Placerville, is averaging 8 feet per day through a hard formation of serpentine greenstone, which in places is heavily mineralized. The shaft was sunk 60 feet on the ledge, which will be reached by the tunnel at 450 feet, giving 250 backs. Open cuts are being made about the center of the claim (which is 2900 feet in length), in one of which six fair-sized seams were found, which are yielding ore that assays above $30 per ton.

J. F. Webb, of St. Louis, representing the Granite Mountain people, is making an extended sojourn in this county, examining its mining resources. Mr. Webb is the inventor of an improved cyanide process, on which he has secured patents in every country in the world using the cyanide method.

Another rich ledge, the width of which is not yet known, has been discovered in the 300 level of the Gentle Annie property.

Meyer & Morrow have reached something over 100 feet in their tunnel on the ledge two miles northeast of Placerville, and are extracting a very fair grade of ore.

Grizzly Flats section, 26 miles southeast of Placerville, is making advances carefully and surely in the development of its mining resources.

Noyes & Langridge have reached 175 feet in their tunnel, adjoining the Gentle Annie property on the north. They are driving through a formation of sandstone. They expect to reach the shaft on their ledge next week.

Raymond & Tanner are discovering encouraging prospects in their development work, four miles southeast of town. They have three claims on the mother lode.

On the Empress Josephine, ten minutes' walk from the courthouse, the tunnel has reached 240 feet. At 150 feet it crosses the east ledge, which, including the porphyry, measures 10 feet.

In the Big Sandy, at Kelsey, sinking and drifting are progressing rapidly, and the work is developing encouraging results.

When the few silurians who hold large areas of mining ground are borne to the dust of earth, capitalists will meet with encouragement in seeking to develop properties for the owner's benefit, without being expected to pay great cash prices for the privilege of a permit to sink on undeveloped properties to ascertain what they may or may not contain. Fortunately there are but few of them left. When they are gone El Dorado county will prove itself one of the richest mining sections of the State.

Placerville, Feb. 23rd, '97.

Placer.

Sentinel: The task of driving the big tunnel of the Eureka drift mine is drawing to a close. Only about 20 feet more remains to be run to reach the hole to the 19-foot mark, where Mr. Chappellet intends to make the upraise. He has been only a little over a year in driving this tunnel.

At the Sellier Consolidated gravel mine, Potato Flat, an upraise will be made from a point 200 feet in on the main tunnel, to tap the gravel.

The Blue Canyon Mining and Develpment Company in the main tunnel are now cutting a ledge of soft slate. From now on rapid progress may be expected in the work of driving the tunnel.

Plumas.

Independent: Active work at the Bullion mine is being done by Nick Fryer & Co., in Mohawk. This property was purchased last fall by Nevada people, and machinery put on for working it. Concentrators are now being put in, and ten men are at work in and about the mine.

There are nine men working at the Claybank mine, and the tunnel is being rapidly driven ahead, about 40 feet per week being the average.

San Diego.

Ramona *Sentinel*: At Julian the Helvetia Mining Company have let a contract to take out 200 tons of quartz from the Helvetia mine at $1.25 per ton.

R. Gardiner has men at work taking out 100 tons of rock from the Richmond mine.

Fisher & Barclay, of Witch creek, are doing considerable improvement work on the placer ground near Ballena, owned by the Santa Ysabel Water Company.

Sierra.

Enterprise: Dr. A. Jump, who has for some time past been developing the old Baker ledge, in Sailor ravine, has built an arrastra and has several men employed.

The pump at the Thistle shaft was started up a short time ago to determine whether the water could be lowered or not. That it could was demonstrated, but it is questionable whether the works could be emptied of the great accumulation of water at this season of the year. At any rate, work was suspended, and it is understood that no effort will be made to resume until next spring. Whether the company will again attempt to work the rich mine through the shaft or tap it by means of a long tunnel, is not as yet determined.

Siskiyou.

Journal: Dr. Simons & Co., of the Minetti B mine, Klamath river, have fixed up their suspension bridge and pipe across the river, to turn the water in the first of last week, and are now working the giants with good success.

The miners of Greenhorn and Yreka Flats are making calculations on doing a great amount of work during the ensuing spring and summer in developing quartz and placer claims. There will be a good supply of water to work the placer mines, as the ground is full of moisture—most too much at present.

News: The affairs of the Gold Ball Mining Company have been adjusted and the mill will be started by March 1st and will employ forty men continually and crush forty tons of ore every twenty-four hours. The ore is from 8 to 15 feet thick and mills from $9 to $12 per ton.

Work in the Forks of Salmon hydraulic mines progresses steadily. W. P. Bennett has control of the water system of this locality and has a large area of mining ground located, which yields steady profits from year to year. There is sufficient ground to employ his plants for years to come.

The mine on McAdams creek, bought by S. J. Dore and others from Mr. Davis, will soon be in operation. Arrangements are now being made to put a force of men to work.

On the McKinley mine there are 150 tons of ore on the dump awaiting shipment to the Chester mill in Quartz valley.

The Diestelhorst dredger now operating in the Klamath, near Oak Bar, is meeting with good success. The river bed is somewhat "spotted," and the machine occasionally runs for a day or so without getting a color and at other times a rich deposit in the river bed will be encountered and several hundred dollars taken out in a day. The Diestelhorst & Barton Company contemplate putting in more dredgers next spring.

Tuolumne.

Independent: The Heath syndicate have bonded the Kelly and Clio mines at Jacksonville.

The Stanley mine on Kanaka creek is to be opened, and for this purpose a large force of men has been engaged.

The Jumper syndicate have recently struck a new shoot of ore on the New Era.

In the Andy Johnson mine at Jacksonville the shaft is now down 100 feet.

The Mountain Belle is now unwatering the main shaft.

Work on the Draper mine continues, and the shaft is now almost cleaned out to within 40 feet of the last level, which is down some 300 feet. Sinking will then begin.

The Alabama mine is steadily sinking and has encountered some very fine ore.

The Black Oak has struck richer ore than ever at the bottom of the shaft.

The new shaft at Whisky Hill is now down 110 feet and a drift is to be run to crosscut the ledge.

The Macaroni mine at Big Oak Flat has recently struck a rich streak of ore.

The Wood Creek mine has its shaft down 80 feet. A tunnel has been started to tap the ledge 200 feet from the surface.

The Shawmut mine has a force of twenty-five men at work. The stamp mill now in course of erection is approaching completion.

The Belleview continues sinking, and the chances are that the ore now being uncovered will warrant final payments on this property.

The Rappahannock will soon commence the erection of a 15-stamp mill, the quality of the ore taken out of late justifying such a course.

The Pino Blanco has recently run its tunnel easterly and encountered a large body of ore 50 feet wide, which assays well. The footwall has not yet been reached.

Union Democrat: The Mammoth has attained a depth of 700 feet, and at that point shows a strong 30-foot ledge of ore. The mill not only does its own crushing, but that of the Shawmut besides.

At the Shawmut Supt. Halsey has fifty men employed underground and on top, and the miners are extracting a good grade of rock.

On the App operations are confined principally to work between the 1000 and 1100 levels, and the twenty stamps drop night and day.

At the Golden Rule the perpendicular shaft has been sunk 500 feet. A 10-stamp mill is on the mine now, but twenty more stamps will soon be added, when the property will be worked to its limit. At present about twenty underground miners do all the rock breaking.

NEVADA.

An expert has estimated that the placer deposits at Rock hill, Humboldt county, Nevada, will yield $1,000,000 in stream gold. The property is operated by a Chinese company.

OREGON.

Rogue River *Courier*: E. C. E. Smith, a mining expert recently from John Day district, has bonded the placer mining grounds on Sardine creek, from Messner's to E. N. Williams', a distance of six miles. It comprises 1100 acres of mining ground and the consideration is $35,000. Mr. Smith expects to sell the property to an English syndicate.

The Baylord-Iliff pump placer mine above town shut down after the cleanup last week and discharged the men. It is said operation will begin again in a couple of weeks. Quien sabe!

Baker City *Bedrock-Democrat*: The Maxwell mine is undergoing extensive development, three levels being run. It is equipped with a 10-stamp mill and four concentrators. It is the intention of the management to start the machinery in motion in the near future. There is a large amount of good rock in sight.

The regular outputs from the Virtue, Bonanza, North Pole, Columbia, Eureka & Excelsior, Red Boy, Union Companion, Gold Ridge and other valuable properties are doing much to stimulate mining in these parts as well as to attract the attention of outside capitalists. A number of new properties, among them being the Flagstaff, Columbian, Perry, Ohio and Rachael, will soon be added to the list of producers, materially increasing the bullion output, which cannot fail to place this favored section among the leading camps of the West.

BRITISH COLUMBIA.

VANCOUVER TO ROSSLAND.

(Special Correspondence).—Interest in mining development in this province continues not only unabated, but rapidly on the increase, and "when the snow flies," men will be at work in every district. In Victoria and Vancouver there is scarcely a man who is not interested in some form or other of mining enterprise, and the same holds good of all the other centers of population in the province, and beyond it into the populous cities of eastern Canada.

The excellent reports of the provincial mineralogist, Professor W. A. Carlyle, have done much to satisfy people that British Columbia is a first-class field for the expenditure of large sums of money in legitimate mining with less than the average amount of risk that is usually involved in prospecting in new country.

Traveling by the Canadian Pacific railroad from Vancouver to Rossland one finds indications of mining every few miles of the way.

At Yale considerable work is going on, and later in the year it is likely to be a busy camp. In the days before the railway it was an important point, being the head of navigation and the depot for freighters and pack teams. Extensive operations are in progress at the Queen gold and silver mine about two and a half miles north from the C. P. R. station at Yale. The managing director is William Teague, Esq., J. P., and his chief assistant is T. H. Rablin. The property is owned and operated by a stock company with a capital of $500,000, the head office being in Vancouver. It is a tunneling proposition and there are about 2000 feet of prospect tunnels. On the Queen mine there appear to be three ledges from 50 to 60 feet apart which at the time of the writer's visit to Yale measured 4½, 6 and 12 feet respectively, and the presumption appears reasonable that they will join at a depth. The rock carries galena, copper and arsenical pyrites and blende. It is not unlike some of the Comstock ores. Later it is probable that the company will put up a cyanide plant and a small smelter. As regards water and wood nothing better is to be found anywhere. Capt. Teague has a number of assays yielding from 25 to 100 ounces of silver to the ton, and gold from 2½ to 6 dwts. per ton. The country rock is a gray garnetiferous gneiss. About 25 to 30 men find employment at the mine.

At Siwash creek, east of Yale, is a group of mines containing an immense body of low-grade, free-milling ore that averages from $2.50 to $6 a ton. This Siwash creek property has been bonded by Mr. Symington on behalf of some English speculators, who expect to be able to work it at from $1.50 to $1.75 per ton. There is plenty of cheap water power to be had, and this expectation may be realized.

Just below the town of Yale is the celebrated "Hill's Bar," which in 1858-9 is said to have yielded upwards of $1,750,000. Above the old Bar, and immediately opposite the town, is a flat of 640 acres known as Hill's Bar Flat. The owner is T. H. Ladd of Merrill, Wisconsin, who has in preparation a very comprehensive scheme for the introduction of an ample water supply.

A good many Chinamen are at work in several localities around Yale, and appear to be doing well.

The population of Yale is about 200. Before the railway came through in 1886 it was about 1500. With the revival in mining it will in all probability soon recover lost ground. Good accommodation is to be had for travelers.

Following the Fraser river up to North Bend, twenty-seven miles distant, some considerable hydraulicking is met with. The work is in charge of Captain M. N. Garland, as the representative of a Montreal company. The ground here is rich and averages well, but the water runs short at times, though the great Fraser river rolls along below the edge of the property. Capt. Garland has cut a ditch and put in a quantity of flume to bring in water from '49 creek, but the ultimate solution of the difficulty in this and some other rich spots in the same district will be some scheme of raising water in sufficient quantity from the Fraser river itself. Last season only one monitor was at work. The gold is unusually coarse, and the cleanup averaged about $100 a day per man.

From the cars at different points along the Fraser river gold dredgers can be seen at work. From what one can learn, they are not very successful. They are in the aggravating position of being able to prove that the gold is there in quantity, but their appliances are insufficient to contend with the difficulties in securing it. The volume of water in the Fraser is great, the current very rapid, and the bed of the river for the most part uneven and broken. In addition, much of the gold that is raised is lost, owing to the enormous quantity of salmon eggs in the water. They make everything greasy, sometimes even choking up the riffles and rendering it almost impossible at times to save the gold. This sounds fishy, but it is true.

In the influx of population that will take place this summer Kamloops will in all probability receive more than its proportionate share of the newcomers. There are several reasons for this, the first being its situation and the next the salubrity of its climate.

The mining excitement has spread to Kamloops and within the past six months about 300 claims have been staked out, principally on Coal hill, a few miles southwest of the town. Some of these claims look promising, but little or no work has been done on the most of them.

The Iron Mask is operated by the British & Canadian Gold and Silver Mining Company, of which Hon. N. Clark Wallace is president. W. T. Newman, a Toronto expert and author of "Hidden Mines and How to Find Them," is in charge of the work. The Iron Mask appears to be a fissure vein. The foot wall is of trap dyke. At a depth of 50 to 60 feet there are two crosscuts. One is in 36 feet and the other 44 feet, and there are no signs of a hanging wall. There is clean ore running from 18 inches to 4 feet on the foot wall, and clean ore again in the 36-foot crosscut. The ore is solid without a break, laterally, and runs to an average of about $70 a ton, all values.

The Python, about four miles southwest of Kamloops, is owned by a local company, the Inland Mining and Development Syndicate, of which W. F. Woods is the president. Considerable work has been done here. There is a shaft down about 55 feet and about 70 feet of tunneling. Both the shaft and the adit are nearly all in ore. Assays give from 15 to 30 per cent in copper and from traces to $40 in gold.

To the west of Coal hill A. G. McDonald and Wm. Ford are opening up the Bonanza claim. There is a 13-foot ledge between well-defined walls from the grass roots. The ore carries copper in considerable quantity and gold from $4 to $21 per ton by assay.

The Tranquille Creek Hydraulic and Quartz Mining Company, Limited, is beginning extensive operations at Tranquille Creek, about nine miles below Kamloops. The trustees are James Vair, J. H. Russell and M. J. McIver. The capital is $250,000, divided into $10 shares. Hewitt Bostock, the newly-elected member to the Dominion Parliament, is largely interested in this company, which starts to work with a large area of thoroughly proved ground ahead of it.

The Yale & Homestake Gold & Silver Mining Company's property is fifty-six miles northeast of Kamloops by wagon road. It is an incorporated company, with head office in Vancouver. The capital is $400,000, divided into 1,600,000 shares of 25 cents each. Sufficient treasury stock has been disposed of to provide for development and to start operations this spring free of debt. Mr. Pellew Harvey, the Vancouver expert, says that there are 60,000 tons in sight, mostly low-grade ore. Already sixty tons of the high-grade ore has been taken out. This averages over 100 ounces in silver, and from $4 to $120 in gold. The low-grade ore averages about 15 ounces in silver and $1 in gold. With a view of working this extensive property (seven full claims) to the best advantage, Mr.

Pellew Harvey has been commissioned to visit Europe, taking with him bulk samples for treatment at Swansea, Glasgow and Freiburg, and it is probable that as a result of his investigations a cyanide plant will be put in at once.

About twenty men are working at the Cinnabar mines, twenty miles west of Kamloops. At the first start of these mines the management erected retorts that could handle two tons a day, but the ore is of so low grade that furnaces capable of handling twenty to twenty-five tons a day are now about being put up. The head office for these mines is in Vancouver, and extensive work is arranged to begin this spring.

The Glen iron mines are about fifteen miles west of Kamloops. They have already shipped over 5000 tons to Tacoma, the ore being used principally for fluxing purposes by smelters. For these the ore has to contain 50 per cent iron. Much of it, however, runs to 65 and 75 per cent. There is an immense deposit, and some day when population increases it will probably be useful for iron on the ground.

At Revelstoke, which is the junction where one turns off to Arrowhead to take the steamer for Trail, there is little going on in a mining way near at hand, though there are prospectors out in the surrounding hills. Many miners, however, make this their winter quarters, and it has all the appearance of a mining town. A stranger can get the best of information upon all matters pertaining to the district upon application to Mr. Graham, the government agent, while at the Columbia House there is a cabinet of large proportions, the collection of W. B. Pool, containing well-indexed specimens of nearly all the varieties of ores to be found within a radius of 100 miles. In the Larado country, forty miles south of Revelstoke, considerable work is going on. Several companies are doing work there on a large scale, and dozens of claims are carrying on development in an unpretentious way, but until summer opens it is difficult to get into the country thereabouts and obtain precise information.

From Arrowhead to Trail, the sail down the Arrow lakes takes a night and most of next day. It is picturesque in the extreme, and the boats are most comfortable. At short intervals nearly all the way there are evidences that the prospector is getting his work in. Some of the specimens brought in from the Arrow lakes are equal to anything hitherto produced in the province.

Trail is a particularly lively camp, building going on in every direction, and good prospects reported all around.

At Trail there is some difficulty in arriving at the exact facts about the smelter, and the gentlemen in charge are somewhat chary of allowing a visitor to arrive at an independent opinion for himself. Mr. Heintze, the owner, in a recently published interview, stated that it is not working up to its fullest capacity, while, on the other hand, the mine owners allege that the smelter cannot overtake what they are prepared to send in. In proof of this assertion they point to the large quantities of ore now being shipped to American smelters and state that Mr. Heintze's statements are largely prompted by the desire to keep competitors out of the field and to maintain the present high scale of prices.

Rossland is about twelve miles by rail and half that distance by road from Trail, and omnibus sleighs run at frequent intervals. Nothing on wheels is to be seen here at this season of the year. Matters at present are quiet in Rossland, but a more detailed account of this remarkable mining town must form the subject of another communication.

During the past year British Columbia has made giant strides. New discoveries are reported everywhere over a territory of from 700 to 800 miles by 400 miles. Indications point to the fact that nearly the whole of it is well mineralized. Attention has been turned to railroads in various directions, and, when outside places are made accessible, while every prospect will not turn out a mine, British Columbia will be reckoned an important factor in the world's supply of the precious metals.

R. W. W.

Rossland, B. C., Feb. 19th, '97.

In the Provincial House of British Columbia the Provincial secretary has presented a return showing the amount of the mineral output of the province for the year 1896. The return also gives the aggregate product for the last seven years. They are as follows:

Year.	*Value.*
1890	$2,668,608
1891	3,546,709
1892	3,017,971
1893	3,588,413
1894	4,225,717
1895	5,655,302
1896	7,146,425

British Columbia's minerals have produced wealth amounting to the enormous sum of over $100,000,000, as follows:

Gold (placer)	$57,704,855
Gold (lode)	2,177,869
Silver	4,028,224
Lead	1,606,427
Copper	254,862
Coal and coke	33,934,427
Building stone, bricks, etc	1,200,000
Other metals	25,000
Total	$100,931,604

The output of minerals from the various districts during the past two years is as follows:

	1895.	*1896.*
Cariboo	$282,000	$384,050
Cassiar	22,575	21,000
Kootenay, East	17,575	154,427
Kootenay, West	2,223,206	4,002,735
Lillooet	40,663	33,665
Yale	241,581	206,078
Other districts	10,000	15,000
Total	$2,834,000	$4,816,955
	1895.	*1896.*
Placer gold	$481,683	$544,026

In 1887 the product of lode mines was $17,331, and in 1896 it had increased to $4,257,176. From 1887 to 1896 the output of silver, gold, copper and lead was from lode mines, $8,067,322. In 1896 the output of coal was 846,235 tons, valued at $2,327,145. The total amount of coal and coke produced since the industry began is 11,248,859 tons, valued at $33,926,662.

UTAH.

THE TINTIC DISTRICT.

(Special Correspondence). — Eighty miles southwesterly from Salt Lake City, on the west slope of the Tintic range, is the Tintic mining district, included in which are the mines of Eureka, Mammoth, Robinson and Silver City. Here is a most interesting district, containing such well-known producers as the Mammoth, Centennial-Eureka, Eureka Hill, Bullion-Beck and Gemini. The first named is principally gold and situate just above the town of Mammoth. The last four are on the Eureka side of the mountain spur which separates Eureka from Mammoth, and are chiefly silver-lead properties. To the southward from Mammoth, and separated from it by a spur of hills, is Silver City, where there are the Swansea and South Swansea mines, which are profitable producers.

The ore bodies of the district occur in immense deposits, ranging in depth from 100 to 200 feet, the great mass of which is low grade, but within are bodies of very high-grade ore, existing in pipes, chutes and other forms. The general strike of the deposit is in a north and south direction, with a dip toward the northwest. It is clearly a contact deposit, between granite below and shale above. The deposit is an extensive mineral zone, consisting of dolomite lime, and has been exploited from Eureka on the north to the Buckeye, south of Diamond.

The ores from the Mammoth, Centennial-Eureka, Bullion-Beck, Eureka Hill and Gemini are of a siliceous nature and carry gold, silver and copper. Those from the Swansea and South Swansea are a sulphate of lead, carrying high values in silver. The Carissa mine, southeast of the Mammoth, is more distinctly a copper property, its ores running 15 to 20 per cent copper, with light values in silver and gold. The Ajax, better known as the Copperopolis, is also a copper mine, shipments from which have been running from 10 to 25 per cent in copper.

The gold ores of the district, which are designated as high grade, run from 2½ to 30 ounces gold. These high grades in gold are observed to run very low in silver. Such ores are largely free milling. The low-grade gold ores, which exist in very large bodies, are found profitable to mill when they run as low as one-half ounce to the ton.

The ore treatment, as exemplified at the Mammoth mill, consists of crushing and battery, from which the material is discharged through a 40-mesh screen upon copper plates. The tailings run automatically from there to Frue vanners, where the baser materials are concentrated. The tailings from the vanners drop to the pan floor and there the pulp is put through the amalgamation process in the regular way. In this mill two-thirds of the values saved are from the amalgam plates, while one-third is in the form of concentrates. This two-thirds saved in bullion comes from 90 per cent of the ore tonnage, and the one-third saved in concentrates comes from the other 10 per cent of the ore tonnage. The Mammoth mill's output, divided up, is 75 per cent gold, 23 per cent silver and 2 per cent base metal.

The depth of the Mammoth main shaft is 1600 feet, that of Centennial-Eureka 1500 feet, Eureka Hill 1100 feet, Bullion-Beck 900 feet, and Gemini 900 feet. At these depths these properties are absolutely dry mines. In the Mammoth, as depth is attained, the silver and copper values appear to grow less, while the gold values of the ore increase. In addition to its main shaft, the Mammoth workings consist of thirteen levels, each of which extend from 500 to 1900 feet. The nature of all these mines makes extensive timbering necessary, which are put up in square sets. The supply of timber for this purpose is shipped largely from Oregon.

The Bullion-Beck has nine levels, amounting to eighteen to twenty miles of working. Here the ore carries comparatively little gold, but averages 50 to 60 ounces in silver and 10 to 15 per cent lead to the ton. The higher grades go to the smelters. The concentrating ore, running 10 to 12 ounces silver and about 8 per cent lead, is reduced in the ratio of six tons of ore to one ton of concentrates. The mine is producing 300 tons of ore per day—100 tons of high grade and 200 tons low and medium grade.

The Eureka Hill is the oldest mine in the district, having been opened as early as 1869. This is on the same hill as is the Mammoth, though on the opposite side from the latter. The Eureka Hill ores differ from those of the Mammoth only in the fact that their silver-lead values preponderate, while in the latter mine the gold is the chief product. Of the output, about one-half the values are saved in amalgam and the other half in the form of concentrates.

The mills of the district are of that capacity and equipment calculated to surprise those unfamiliar with the district. The Eureka Hill mill, which is claimed to be one of the largest combination (amalgamation-concentration) mills in the world, has a capacity of 200 tons per day, though it is not now running full time by reason of insufficient water supply. It has 100 rapid-drop stamps. The Bullion-Beck mill is purely a concentrating plant and is equipped, for the treatment of low-grade ores, with jigs and Cornish rolls and Frue vanners, and treats 200 tons per day. The Farrell mill is of the same type as the Mammoth and Eureka Hill, but of much smaller capacity.

The Centennial-Eureka, the Gemini mines and others have no milling facilities and ship their product to the smelters.

Some experiments have been made on Tintic ores with cyanide treatment, and it is claimed a saving of 85 to 90 per cent was made in these tests. These ores, however, differ materially from those of Mercur which yield to cyanide, in being very hard and of close texture.

Twenty-five miles west of Mammoth are the springs of water and pumping plant of the Mammoth Mining Company. A pipe line conveys the water to Mammoth and Robinson and supply the mine, mill and the two towns. The plant was put in at a cost of $100,000.

It is not outside the range of conservatism to say that Tintic district is one of very substantial character, as shown by present development and production, and, so ar as the future is concerned, is one of the most promising in the State of Utah. The district has superior transportation facilities, having the Union Pacific and the Rio Grande Western, both of which afford good train service.

WASCOTT.

Eureka, Utah, Feb. 17th, '97.

SOUTH DAKOTA.

Black Hills *Times*: Dacey and Kilpatrick Bros. will in a short time inaugurate extensive development work on their claims in Ragged Top and on the Iron creek divide. A new hoist will be placed on the Flora shaft, which is now down 230 feet, and still in the lime formation. Regular shipments of ore are maintained from the original workings, the output being from 35 to 50 tons per week. Some thirty-five men are regularly employed on the property.

A new district is now being opened up in the scope of country between Custer Peak and Nahant station, on the line of the B. & M. railroad. Considerable float rock has been found which assays from $2.50 to $18 gold per ton.

The Keystone Mining and Milling Company have accepted a proposition for the sale of their property to an English syndicate, and preliminaries were recently closed by which the proposed buyers have sixty days to examine and satisfy themselves of the value of the property.

Baldwin and Pinney are making a success of treating the Keystone concentrates by the cyanide process.

WYOMING.

In the Keystone district a rich strike has been made in the Mastodon mine, the properties of the Spring Creek Placer Company. At a depth of 40 feet a streak of white iron ore has been struck, averaging from 15 to 18 inches in width and showing free gold running into hundreds of dollars per ton.

At South Pass mining is being revived through the successful application of the cyanide process to large bodies of ore in the region heretofore supposed to be of too small value to work. During the past week eight cyanide plants have been located in the district, most of them working on the tailings of abandoned mines. The first plant was brought in by two Mercur, Utah, men who purchased an old dump for $500. They put in four cyanide tanks and cleaned up $7,500 in the short season which followed. All of the old dumps in the district are now in demand.

A discovery of gold in a limestone formation, similar to that of the Ragged Top ore, has been made at the Needles, on Clear creek. There has been a big rush to get claims and a large number of locations are being made.

Negotiations are being made for the sale of the properties of the Douglas Consolidated placer properties in the Keystone district. The purchase price is placed at $80,000, and an equivalent will be spent in putting the property in working order. The Breitung Mining Syndicate of Chicago, is the prospective buyer.

The Spring Creek placers, in the Douglas district, have been sold to an Eastern syndicate represented by Weir & Sturgis of Cheyenne. The purchase price is given at $24,000, and the first payment has already been made. The property, which was owned by C. G. Wolcott, William Storey, Thomas Hale and W. O. Owen, contains 740 acres, extending along Spring creek for a distance of three and a half miles. The new syndicate will at once commence work on a six-mile ditch from Douglas creek. This, it is estimated, will cost about $9,000, and will be completed in time for this season's work.

MONTANA.

Inter-Mountain: The property of the Clinton Mining Company was sold recently to Henry Williams, the general manager of the Colorado Mining Company, for $7400. The Clinton mine is located in Park canyon. Mr. Henderson purchased the property for about $40,000 eight years ago and expended $45,000 in running a tunnel 1800 feet into the side of the mountain.

At the Diamond Hill mines, of which Col. Thomas Ewing is manager, the recent rich strike in F tunnel holds as good as when first cut. It has proved to be the best large ore body yet uncovered in the mine. A force of men has been drifting on the ore, running a tunnel 9 feet wide by 9 feet high in the clear, all in ore. Practically all of the ore is said to be free milling, and, while not high grade, is rich enough to yield good returns for the milling. The men are pushing the tunnel from 16 to 20 feet a day.

The quartz mining industry of Beaverhead county employs 300 men, placer mining 75. For the calendar year 1896 the production of metals was as follows: Gold, 3025 ounces; silver, 360,470 ounces; copper, 239,631 pounds; lead, 1,326,997 pounds.

Butte *Miner*: The Montana Ore Purchasing Company has suspended work at the 800-foot level at the Glengarry for the present. The pumps have been hoisted to the 400-foot level, where the water will be allowed to rise. About 150 tons of ore are hoisted daily, partly by lessees.

At the Atlantic mine sinking to the 800-foot is in progress. At the Leonard shaft the working force is increased and the amount of ore hoisted is 400 to 450 tons daily. At the West Colusa only a few men are employed and nothing but first-class ore is hoisted through this shaft.

It is reported that an agent of the Butte & Boston Company has been negotiating for the Climax mine at Divide, about eighteen miles from Butte. The mine has been worked for many years and a good deal of valuable ore taken from it.

The shaft at the Colusa Parrot mine is down to the 1200-foot level, where a station is being made, and from the station crosscutting will commence at once. At the Original mine sinking is going on and before a station is made the 1000-foot level will be reached.

The Park canyon district is attracting more attention at present than for a long time past. The strike reported in the Sullivan mine has had the effect of increasing the interest in claims in the locality.

The Colorado Company will soon put an increased force of men on the Old Glory mine, which was purchased last month from John Bordeaux and others for $45,000.

COLORADO.

Denver *Republican*: At Cripple Creek the January gross production of the Elkton mine amounted to $81,310.60, which returns a net profit of $59,159.56. The property is looking exceptionally well and is producing some ore that averages $223.77 per ton. The milling ore will run over $45 per ton. The main double compartment shaft has a depth of 400 feet, while the number of feet run in levels up to date is 4,325. From September, 1895, to Jan. 31, 1897, the gross production from the property amounted to $602,046.26.

The total production from the Union Company's Bull hill properties for January amounted to thirteen broad gauge cars, ten of which contained smelting ore, and three mill grade. The smelter returns received up to the present time for January are $14,972.45. The disbursements for January, including construction, permanent improvements and mine operating expenses were $21,500.

The Bacon Gold Hill Consolidated Gold Mining Company have executed a bond and lease on its Gold hill property, the Bryanboro, and a lease on its Beacon hill claim, the Lucky Boy. The bond on the Bryanboro calls for $75,000 and the lease runs for eighteen months. Kansas City parties will operate the property. The Lucky Boy claim has been leased to Cripple Creek parties for a term of eighteen months.

Murphy & Judkins are producing an average of twelve tons a day from their late find in the Smuggler of the Isabella Company.

After reaching the vein from the first station in the new shaft on the Pharmacist, a level has been run 60 feet on the ore, showing the pay to be from 2 to 4 feet in width. The ore broken in the new level is paying all expenses of operating the mine. Since August Manager A. D. Jones has expended between $50,000 and $60,000 in dead work and improvements.

February is going far ahead of January in the production of ores from the Cripple Creek district. The same overcrowded condition exists at the mill, but the ore haulers and railroads have expanded to meet the heavier tonnage, and things are better adjusted all around to the increased output. Just what the increase will amount to cannot be accurately foreseen, but at the present rate the aggregate will reach $1,500,000.

At Ouray in the Bank of San Juan in the Sneffles district, a force of men is driving a crosscut to cut the vein at a depth of 600 feet from the surface, and the tunnel is now extended 1,000 feet.

Col. Mix, owner of the Calliope, reports 350 feet of high-grade ore stripped in the upper level, with 800 feet of stoping ground overhead.

The shaft in the Wedge is down 370 feet, where a station is cut, and a level driven to both veins, which are apart about 70 feet. The main vein at the point of contact shows a large body of high-grade ore and the spur or feeder contains a fair streak of low-grade ore, which does not pay for shipment alone, but would realize rich returns if treated by smelters near by, and this can be done in the spring, as Ouray has three propositions of this kind in contemplation for erection within two months.

The Fowler smelter is likely to be the first in the field, as news was received last week to the effect that the machinery for the plant is all completed, with the exception of the furnace, which is now in course of construction.

About seventy-five dump cars of ore per shift is the average coming out of the Revenue tunnel at present.

Warde & Co. will resume operations on the Esperanza this week. A crosscut will be driven 175 feet to tap the vein and then 200 feet will be run on the latter.

A long crosscut is being driven by Theo. Hess to tap the Black Silver vein at about 350 feet in depth.

ARIZONA.

Prescott *Courier*: At Walnut Grove, S. E. Fuller, of Prescott, and Mr. Sweeney, of Chicago, have been prospecting placer ground with the intention of putting up a steam plant.

Placeritas mill is running steadily with thirty men at work in the mill and mine.

McNary Bros. have struck some rich placer ground on Mill creek and are taking out from $5 to $8 per day.

Globe *Silver Belt*: Active operations have been commenced at the United Globe mines which consist of some thirty mining claims, a smelting plant, cable tramway and other improvements necessary to the operation of the mines. The supply of ore is drawn principally from the Hoosier, Buckeye, Dime, Big Johnny and Birdsnest.

The United Globe Miners' Company, owning thirty of the richest copper mines in the Globe district, has started its furnaces again after a suspension of several years. A 3000-foot bucket ore carrier from the main property to the smelter has just been completed and works well.

Scientific Progress.

Formation of Clouds.

Until John Aitken proved by experiment that cloud particles are formed by the adhesion of water vapor to the dust-particles invisibly floating in the atmosphere, little was known of the real nature of clouds. The lowest stage in the formation of clouds is haze. The sultry haze, the suffocating fogs, the drizzling mists and the thin rain, as well as the pelting hail and the feathery snow, are now all known to be different stages of the vapor in the air on the minute dust-particles at different grades of heat and cold. The formation of the clouds is now distinctly understood. But, says Dr. MacPherson, the attention of the meteorologist has not been so much directed to the decay of clouds.

Whenever a cloud is formed it begins to rain, and the drops shower down in immense numbers, though most minute in size. No doubt it is only in certain circumstances that these drops are attracted together so as to form large drops, which fall to the earth in showers, or deluge. But when the temperature and pressure are not suitable for the formation of what we commonly know as rain, the fine drops fall into the air under the cloud, where they immediately evaporate from their dust-free surfaces if the air is dry and warm. Whenever a cloud overhangs, fine rain is falling, so that the cloud is in the process of decay; but this rain may not reach the earth on account of the dryness of the stratum of air beneath the cloud, and the heat of the air over the earth. So that on a summer day, with the gold-fringed fleecy clouds sailing overhead, it is really raining, but the drops, being very small, evaporate long before reaching the earth. It rains, but much of this melting of the clouds is reproduced by a wonderful circularity, the moisture evaporating, seizing other dust-particles in a cooler stratum, forming cloud-particles, forming again, and so on *ad infinitum* during the existing circumstances. That is the reason why surfaces may be exposed to a cloud on a mountain side without being wetted. Radiant heat is the cause of the remarkable result. The rays of the sun, which strike the upper part of the cloud, not only heat that surface, but also penetrate the cloud and fall on the surface of bodies, generating heat there. These heated surfaces, again, radiate heat into the superincumbent air. This warm air receives the fine raindrops from the decaying cloud and dissolves the moisture from the dust-particles before the moisture can reach the surfaces exposed. That a vast amount of radiant heat rushes through a cloud is clearly shown by exposing a thermometer with black bulb *in vacuo*. On some occasions a thermometer would indicate from 40° to 50° above the temperature of the air, thus rendering the surface quite dry. Hence seats, walls, posts, etc., may be dry, though in the middle of a cloud which is gradually decaying.

Of the numerous new substances made known by chemists early in the present century, Dr. T. L. Phipson says, in *Knowledge*, by far the most unpromising of possible usefulness was the metal thorium and its oxide thoria. Berzelius, the discoverer, succeeded with difficulty in extracting a minute quantity of the metal in powder from the Norwegian rocks. Aside from burning at a red heat with greater brilliancy than even magnesium, thorium seemed to have no striking properties, and its oxide resembled common lime, but the light-giving property is just bringing this rare metal from the complete oblivion in which it has lain for seventy years. Of all the metallic oxides that have been tried for the "hoods" or "mantles" of incandescent burners, which are making street gas a rival of the more expensive electric light, none has proven equal to thoria. The consequence is a brisk demand for this substance, so long believed to be useless, and at various times during the last two or three years a pound weight of thoria has been freely sold at from $220 to $250. The minerals thorite, orangite and pyrochlore, which contain a large amount of thoria, are still very rare. A more promising source of supply is monazite, which contains 18 per cent of thoria, and forms 1 to 7 or 8 per cent of the so-called monazite sands that have been recently found in some quantity in North Carolina, Brazil and Quebec. Several hundred tons of the sand are now shipped yearly from Brazil to England or Hamburg, while a ton of the Norway thorite and orangite supplies $35,000 of thoria in the same time.

Silichromite is a new mineral compound, manufactured in France. It is an extremely hard, crystallized mass, but easy to pulverize, and is used for molding and polishing purposes. The product is obtained by treating natural chrome ore, sand and coal in an electric furnace. Chromate of iron itself is a mixture of chromite, protoxide of iron and aluminate of magnesia. When to this mineral silica and carbon is added, and the mixture subjected to the heat of the electric furnace, there remains in the furnace a molten mass of crystalline structure, in which the silicate of chrome predominates. It will be seen that silichromite is closely related to carbide of silicon or carborundum.

Electrical Progress.

"Wood" Direct-Current Multipolar Dynamo.

The dynamo, illustrated on page 169, runs at a comparatively low speed, while the temperature, when run continuously on full load for ten hours, rises but 35° centigrade above the room. The lower portion of the field and pedestals is cast in one piece and is mounted to slide on a metal sub-base, on which the dynamo is reversible. This is brought about by the use of a curved pedestal at the commutator end, which enables both ends of the bed to be equally distant from the center of the field magnets. The field coils are wound on steel shells, which are slipped over the poles and held in place by the pole shoes. It will be noticed that there is an entire absence of terminals and other connections around the field magnets of this dynamo, there being only the two cables, which leave the brush holders and pass under the base, where they make the necessary connections with the field coils and main binding posts, which are mounted on slate bases at each side of the forward pedestal. The two small binding posts, shown in front, are connected with the shunt coils and are intended for connection with the field rheostat.

The Mutual Electric Light Company, San Francisco, have purchased a generator of this character, of 200 kilowatts capacity, for operating a power circuit in this city, which will shortly be placed in operation. This dynamo is manufactured by the Fort Wayne Electric Corporation of Fort Wayne, Ind., represented by Chas. R. Lloyd, 18 Second St., San Francisco.

New X-Ray Phenomena.

Sir David Salomons has recently been experimenting with X rays and contributes the following results:

1. A strong magnetic field stops the passage of the current in the tube.

2. With a "shadow cross" tube, a very small magnetic field near the cathode causes the shadow to disappear.

3. A bar magnet (say 9″×1″×½″) will produce the same result when held anywhere near the side of such a tube. If the magnet is too weak, then the shadow will not quite disappear.

4. If a pole of such a bar magnet be held axially to the tube and the pole placed to one arm of the cross, then on rotating the magnet in a circle (i. e., its axis describing a cylinder) the cross will rotate also, either following or advancing before the pole according to the pole applied; in other words, attracted or repelled.

5. The bar magnet also affects the "focus tube," rendering the X-ray results far less when a pole is near the tube.

6. In a suitably adjusted magnetic field a Crookes tube exhibits only the usual vacuum tube phenomena.

7. Further, the ordinary radiometer ceases to act in a strong magnetic field.

Electrical War Devices.

The microphone is now being experimented upon with a view to making it available for detecting the approach of a hostile force while the latter is yet some distance away and far beyond ordinary hearing. The microphone will magnify the sound of the footsteps of a fly until it is almost as loud as the noise made by a man's feet. In its proposed modifications it will attune itself to the vibrations made by the feet of distant soldiers on the march and thus betray their presence and their probable numbers to the pursued or pursuing army possessing such a valuable instrument. A great change has taken place in the sapping and mining department of the army since electricity was introduced on a practical basis. Mines are now laid by the engineer corps and exploded with a far greater degree of nicety than when slow-burning fuses were used. Rivers can now be guarded almost by one man, stationed where he can operate a circuit in which a number of submarine torpedoes are included. The torpedoes used in the army differ from those used in the navy. The latter include a propelling apparatus which carries them through the water; those used in the army are generally anchored at the bottom of a stream. Given a number of torpedoes, judicially placed, a single officer could make the passage across a river by an army a decidedly hazardous undertaking. The value of electric firing as far as the guns themselves are concerned is admitted, particularly on shipboard or for coast defense. There is no lost interval of time between the command of the gun captain and the actual exploding of the piece. The instant the gun is to be fired the officer connects the circuit and the ball is on its way to its destination. If the object aimed at be a distant vessel, rising and falling with the waves, or a moving body of cavalry on land, the value of an instant discharge can be easily recognized. The possibilities claimed for the balloon of the future are dazzling. For instance, army officers say that there is nothing improbable in the supposition of a general of the future using a balloon as a point of observation and transmitting his orders by wire to his army beneath his feet. An officer with everything thus under his eye could be in electric communication with every gun on the field, just as the commander of a man-of-war in his conning tower is able to personally operate every gun on his ship.

The Place of Electricity in the Chemical Industries.

In a lecture recently delivered by M. Moissan before the Conservatoire des Arts et Metiers, he prefaced his remarks by saying that the future of electricity lay, not in lighting and distribution of power, but in those lines in which there was nothing comparable, such as telephony, surgery, medicine and particularly electro-chemistry.

In the lecture it was stated that the temperature of the voltaic arc remained constant, being about 5400° Fahr., independent of the number of watts. By means of this heat, generated by the current from a fifty-horse machine placed at his disposal, M. Moissan produced quarter-pound ingots of chromium, manganese and uranium respectively. This was compared with the method by which these metals were formerly prepared in a free state and sold at a price gradually cheapening from that of the same weight as diamonds.

The lecturer then described the calorimetrical methods adopted by Mr. Violle in determining the temperature of the arc, and ended by describing this method applied to the manufacture of artificial diamonds. This is as follows: After producing in his electrical furnace an ingot of iron, carburetted to saturation, he plunged it into a vessel of water. The great temperature prevented the water boiling, but making a coating of gas around the ingot, which protected the iron from contact with the water. Graphite was first formed, then dense, drawn-out carbon, then black diamonds with a crystalline form, and finally true diamonds having all the characteristics of the natural stone, the faculty of absorbing and holding light, the crystalline form and the great density.

Electric railways in the United States in the last ten years have increased from 13 to 850. There were last year 23,000 electric cars and over 9000 miles of track, the whole system representing a capital of $400,000,000.

Power developed by the Niagara Falls electric plant and transmitted to Buffalo, N. Y., will cost $36 per H. P. per year.

Mechanical Progress.

Figuring the Capacity of Boilers.

As no method has been devised for testing the evaporative capacity of a boiler without the furnace on which it is placed, all so-called tests partake more or less of the nature of guesses, as it is impossible to tell with any degree of exactness, whether the results obtained, favorable or otherwise, are to be credited to the design of boiler or furnace. To this uncertainty is probably to be ascribed the well known discrepancy in the size of boilers offered by different makers when any particular capacity is called for, which again has led to the now common practice of laying down specifications of size of shell, number and diameter of tubes, etc., when bids on boilers are called for. The boiler maker thus becomes merely a mechanic, whose whole duty it is to assemble the materials called for and put them together in a workmanlike manner, and being thus to a great extent relieved of responsibility, is expected to lower his price proportionately. While this may be satisfactory to some who would rather use their muscles than brains, it discounts ability and so is disliked by those who, from close study and long experience, consider themselves fitted for better things.

In a recent case where bids were asked for a number of boilers for a municipal plant, instead of specifying the heating and grate surface to be furnished per horse-power, there was stated the amount of water to be evaporated, the quality of the steam, *i. e.*, its dryness as shown by the calorimeter, and the efficiency to be reached, with the kind of coal it was the intention of the city to use. This new departure would seem to be worthy of an extensive following, as it places the responsibility of the design of boiler and furnace where they belong without dividing it between designer and builder as the other plan does.—F. Riddell in The Boiler Maker.

Water Scoops for Railways.

Railways have for a long time made use of water scoops, let down into troughs set between the rails, to refill engine tenders without stopping trains. Such devices, it is claimed, have never been entirely satisfactory, because water could not be taken in this way without running slowly. If the speed were too great it became impossible to lift the scoop from the water, and in consequence it was smashed against the end of the trough. The Pennsylvania Railroad has since the middle of 1894 adopted as standard a device, in which it is claimed the power required to lift the dipper from the water is entirely independent of the speed of train.

This result, to speak generally, is arrived at by balancing the lower curved portion of dipper near its center

on trunnions about which it turns within limits. The upper end of this dipper is connected with the uptake pipe by a joint supported on another pivot.

The force of impact of water on the lower half of dipper tends to hold it down, while the similar force acting on the upper half tends to lift it. It is stated that these forces practically balance each other, and that trains have, with this device, taken water at a speed of seventy miles per hour, filling a 3,000 gallon tender in nine seconds.

The advantages claimed are easy manipulation, and no lost time, less water wasted by being splashed out of trough, and more water taken per 100 feet of trough, which can therefore be shorter and cost less for construction and maintenance.—Railway Gazette.

The Mammoth Globe at the Paris Exposition.

The project of M. Borgel-Court to construct at the Paris Exposition of 1900 an enormous structure in the form of a geographical globe of 150 meters in diameter quite casts into the shade both the Eiffel tower and the Ferris wheel. Those who visited the Paris Exposition of 1889 remember the globe there shown, which, however, was only about 42 feet in diameter, one millionth of the earth's diameter, and was intended solely as a geographical exhibit.

The proposed monstrosity, as described and illustrated in *La Revue Technique*, however, is a far different affair. It is to contain upon its five interior floors representations of all the various countries in the world. The visitor is to be transported by electric railways from one country to another in such a manner that, in traversing the interior of the structure, he will practically visit every country on earth (apparently with the exception of Germany), finishing, of course, at a restaurant on the platform on top.

The entire cost of the proposed globe, including the expenses of operation during the exposition, is estimated at 10,000,000 francs.

Engineering, London, pays a handsome tribute to machine tools made in the United States, saying: "It is not a reassuring thing for those who would see the engineering supremacy of this country maintained to notice how certain American firms have ranged ahead of us in the production of a light class of machine tools, of which bicycle making machines afford an example."

Practical Information.

Olive Green Squadron.

Olive green will be the fighting color of the new ships of the navy of the United States. That is the decision arrived at by the Navy department officials, and, were war now to be declared, every cruiser and battleship in the fleet would be dressed in an olive-green tint inside of thirty-six hours. Olive green has been found to be the color least visible at sea. There are other colors which would be more suitable for certain operations, but for all-around work the shade selected is deemed the best adapted. The Cushing demonstrated, under the powerful rays of the searchlight, that white was readily picked up. On the other hand, a black object was less easily detected by the searchlight than a white one. A black object is probably the least difficult for a lookout to discover when scanning the water on a dark night, and when depending entirely upon his eyes. During the late war the ships of the Union fleet were, during the closing years, painted a drab. This idea was taken up from the blockade runners. The latter, in steering into the mouth of a harbor, were often able to discern the black hulls of the blockading ships long before the blockade runner could be made out. For day work at sea a drab color has many advantages. It more closely approaches to the shade of the atmosphere, and to the tone of the horizon backing the ship. But at night the searchlight readily makes out a drab-painted object. The olive green which has been selected for the new navy ships is not only difficult to make out by day, but experience shows is the hardest known color to discern at night, when under the searchlight rays.

The torpedo boats' commanders are particularly interested in the subject of ship paints. It means much to them, whether or no their vessels are discovered by the enemy's searchlight when at a distance of 1500 yards from the enemy or at 700 yards. The earlier the charging-on torpedo boat is discovered, just that much longer will she be under fire. During the fight with the insurgent Admiral Mello in 1894, the loyal ships of the Brazilian navy were painted a greenish shade. The torpedo boats which attacked the rebel Admiral's flagship, the Aquidaban, were enabled by reason of their green-tinted hulls to approach within 400 yards of her before being discovered. The remaining charge home space was of such short duration that the Aquidaban was torpedoed before she could beat off her assailants. The new paint color is not to be applied to the sides of the warships by any method of guesswork. The exact proportion of the mixture has been accurately determined, and is so issued to the commanders of warships. The white squadrons are conspicuous, pretty objects in peace time, but, presto, all will change when it comes to war.

Abandonment of a Social Experiment.

The London *Times* says: "Two schemes for insurance against want of employment have existed for two or three years past in Switzerland, one in the canton of Berne and one in that of St. Gall. The former was voluntary, but in St. Gall the laborer was compelled to insure. The American consuls at Chemnitz and St. Gall have both recently reported on the subject, and the former states that men whose work is steady and likely to continue so complain bitterly that they are compelled to support in idleness others whose labor is uncertain, but who, for that reason, are better paid when they are at work. 'It is not in the nature of things for such a system to succeed, even among so loyal, loving and gentle a folk as the Swiss. The effort is not vain if it will teach the thoughtless how hard it is to make laws, or to institute any system that is to take the place of thrift and economy during the days when work is plentiful.' Some time after this report the consul at St. Gall wrote that the experiment had been abandoned at the instance of the laborers themselves. He says they 'found that a system which insured against loss of work resulted in the promotion of laziness and idleness. In fact, a knowledge of the existence of this system of insurance had drawn to St. Gall a considerable number of unemployed from other parts of Switzerland, with the object of obtaining support at the expense of resident laborers.' Hence the system disappears on and after June 30 next."

J. D. VARNEY, in a paper in the Journal of the Association of Engineering Societies, describes one of the latest devices for determining the meridian from the position of the sun without computation. It consists of the usual transit-theodolite, with one attachment and one modification. The modification is that the telescope is carried in a tube which is connected to the horizontal axis in the same manner that the telescope usually is, and is free to revolve in this tube about its own axis. The attachment is a mirror revolving on an axis attached to a small ring which fits on the object end of the telescope. Slow motion is provided for. The mirror is set with the aid of the horizontal circle and a special target, so that it reflects the line of collimation at an angle equal to the angle between the earth's axis and a line from the earth to the sun, (*i. e.*, ninety degrees—sun's declination). The telescope is set at an angle of depression equal to the latitude of the place. The instrument is revolved about its vertical axis, and the telescope about its own axis, until the image of the sun appears in the cross hairs, and then the instrument is pointing in the meridian. The writer claims that with due regard to refraction and hour angle a meridian of sufficient accuracy for all ordinary work can be obtained.

THE degree of danger that may exist in eating the flesh of poisoned animals has been investigated by Lewin, whose experiments have been described to the Medical Society of Berlin. The flesh of a fowl that had been killed by three grains of strychnine was fed to a dog, which became ill on eating half a pound, and was seized with tetanic convulsions and died after consuming a second portion. Some animals are not readily affected by certain poisons. For example, fowls proved very tolerant of strychnine, goats of hemlock, partridges of arsenic, rabbits of nicotine. It is concluded that, even where the animals that have swallowed poison did not seem to have suffered inconvenience, the flesh may be unsafe food for man.

ACCORDING to *l' Echo des Mines*, of Paris, the longest suspended wire in the world is in Switzerland. The wire has just been stretched across the Wallenstadt lake in the canton of St. Gall, by the Swiss telephone administration. This wire is suspended from two iron towers erected for the purpose, the distance between these supports being 2400 meters. At the lowest point it is 40 meters above the water. The wire is of steel of the best quality and is 2 millimeters in diameter.

THE prehistoric monuments of France, England and Germany have been carefully recorded. The first American archæo'ogical map is that of Ohio, on which, in three years, the curator of the Onio Archæological and Historical Society has located more than 5000 village sites, mounds, fortifications and graves, while probably 10,000 remain to be put down.

Cripple Creek—Its History to Date, Illustrated. Just out, with correct map and costly full page views natural as life. This great book will be sent free prepaid with our big 56-col. family paper 3 months on trial for 25c (stamps or silver); club of 5, $1. Latest mining news. Mention The Press and address *Illustrated Weekly Sentinel*, Denver, Colo.

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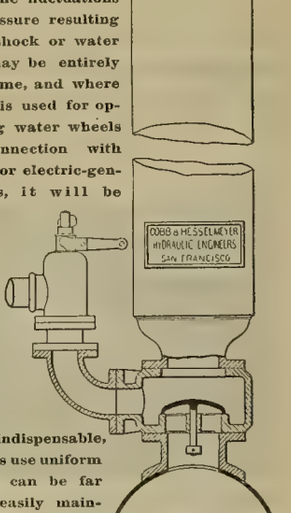
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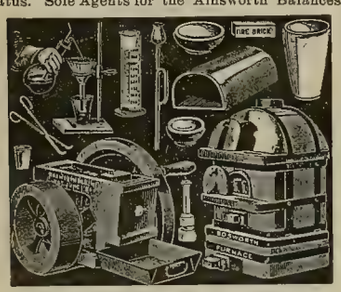
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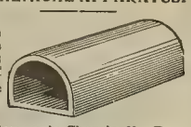
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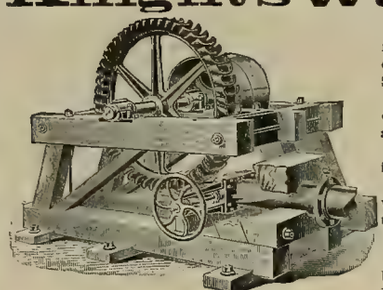
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Wheels inclosed in iron cases, from 6 to 24 inches.

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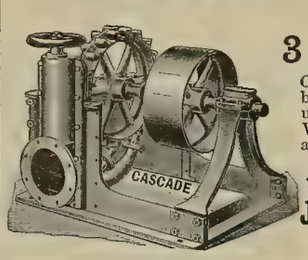
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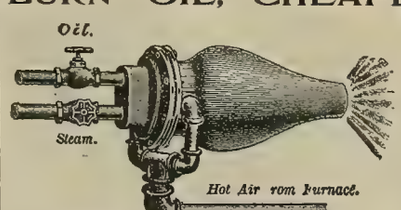
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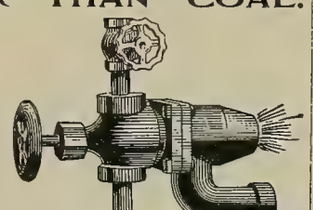
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Coast Industrial Notes.

—The editor of the Gold Creek, Nevada, *News* has sent some of the wood called mountain mahogany to the East to be tested as to its value for wood type.

—Next to the United Kingdom, Mexico bought more United States machinery in November, '96, than any other nation. The sales amounted to $342,884, against $141,147 in November, '95.

—The Los Angeles, Cal., *Investor* says the Watsonville beet-sugar factory has now the world's record for the largest production of sugar in one season, having already produced 18,881 tons of sugar and cut 150,653 tons of beets.

—The Wood River, Idaho, *Times* says the new Nampa & Silver City Railway is completed to the Snake river—twenty-two miles out from Nampa—and ready for traffic. The other forty-one miles of the road are to be completed by May 1st.

—From the State of Nevada during December and January, to different points in California, there were shipped of cattle, 390 cars containing 7660 head; sheep, 195 cars containing 19,045 head; calves, 3 cars containing 135 head; horses, 3 cars containing 44 head; hogs, 12 cars containing 966 head.

—Word comes from Anaheim, Cal., that three new oil wells are being sunk near Placentia to supply fuel for the sugar-beet factory at Los Alamitos. The wells in operation at Puente are being taxed to their utmost in furnishing fuel for the Chino factory, which consumes 1000 barrels a day during the working season.

—The Truckee and Lake Tahoe Railroad Company has incorporated to connect the town of Truckee with the northern shore of Lake Tahoe at or near Tahoe City, seventeen miles. W. S. Bliss of San Francisco, M. L. and I. L. Requa of Oakland, D. L. Bliss and W. D. Toby of Carson City, Nev., are directors; capital stock, $208,000; $20,000 subscribed.

—For San Diego is proposed a new telephone system, not only covering the local field, but connecting with Los Angeles, Riverside, San Bernardino, Redlands, Pomona and Pasadena. The promoters are business men of Los Angeles, who have organized into a corporation known as the Home Telephone Company, with a capital of $500,000, divided into 50,000 shares.

—Twenty-two thousand acres of land, formerly belonging to the Semi-Tropic Land and Water Company, have been transferred at Los Angeles by the San Francisco Savings Union to a company of English capitalists. The price was over $500,000. Two thousand acres lie in the Rialto irrigation district. One tract of 2000 acres will be cleared at once for planting canalgre.

—Thirteen million feet of American lumber were imported into China last year. According to United States Consul Jernegan at Shanghai, most of this came from Washington and Oregon. The Chinese have completely denuded eastern China of its timber and are now drawing upon ours. Recent stimulation of mill building in China and the growing liking of the natives for foreign style houses have led to much of this demand.

—The Southern California Power Company has been organized in San Bernardino, Cal.; capital stock, $1,000,000; principal stockholders, H. Fisher, Pittsburg, Pa., and H. H. Sinclair, Redlands, Cal.; to develop power from the Santa Ana river, to be transmitted by pole line seventy-five miles to Los Angeles, for lighting and railroad companies. If it goes, it will be the longest line and handle the highest voltage (30,000 volts) in use in the world. It is intended to begin work about April 1, 1897.

Personal.

AUG. J. BOWIE, JR., son of Aug. J. Bowie, has returned from the East, and will begin the practice of his profession in this State. Mr. Bowie graduated with honors at Harvard, and later at the Massachusetts Institute of Technology, took degrees in both electrical and mining engineering at the same time, and with honors, the first time this has been done.

AT the twenty-seventh annual session of the American Institute of Mining Engineers, held in Chicago last week, the following officers were elected: President, George S. Brown, South Bethlehem, Pa.; vice-presidents, D. W. Brunton, Aspen, Colo., W. E. Eustis, Boston, James Douglas, New York City; managers, C. W. Goodale, Butte, Mont., Frank Lyman, Brooklyn, Frank M. Stanton, Houghton, Mich.; treasurer, Theodore D. Rand, Philadelphia; secretary, Rossiter W. Raymond, New York City.

THE Governor has appointed A. S. Cooper of Santa Barbara State Mineralogist, to succeed J. J. Crawford, whose term has expired. Mr. Cooper has been a resident of Santa Barbara for thirty years and has devoted his attention largely to developing the asphaltum beds. He is a native of Maryland, and came to California in 1852. He lived in Columbia, Tuolumne county, when a boy, and went to White Pine, Nev., in 1869 as an assayer. Since 1870 he has practiced the profession of civil engineer, hydraulic construction, mine surveying, etc. In 1872, in connection with others, he opened a quicksilver mine north of Santa Barbara. He has recently been engaged in running a 1000-foot tunnel in the sandstone of the Santa Ynez mountains to acquire water for the Santa Barbara municipality.

Commercial Paragraph.

THE Mazapil Copper Company of Saltillo, Mexico, has given a contract to the Colorado Iron Works of Denver, Colorado, for three elliptical bowl slag trucks. The same company will furnish a double pot slag truck for the Compania Minera Fundicion y Afendora of Monterey.

A Great Mining Triumph.

Capt. J. R. DeLamar, of New York City, is one of the largest owners and workers of Gold Mines in the world. After the most careful investigation he purchased in August, 1895, two Griffin Mills, and his report is so remarkable as to demand the careful attention of every one interested in Gold Mining.

We give it in his own words.

NEW YORK, Jan. 9, 1897.

BRADLEY PULVERIZER CO. *Gentlemen*:—The two Griffin Mills have been in operation now for 70 days on the hardest rock, with the exception of corundum, that I have ever met during my mining life. They have taken the rock direct from the breaker and they average about 20 tons to each machine, 40 mesh fine, without elevating or bolting. We simply put a ¼ mesh screen around the Griffin Mill, and the stuff comes out 40 mesh fine or over, which makes it an excellent pulp for leaching by cyanide or chlorination; therefore we have concluded to order **10 more Griffin Mills**. We have tried high-speed rolls and dry stamps, and after looking into the Huntington Dry Pulverizer, the Narod Pulverizer, the Stedman Pulverizer, the Frisbie Lucop, the Cook, and various other dry pulverizers, unhesitatingly recommend your Griffin Mill to any one.

Yours truly, (Signed) J. R. DELAMAR.

HOW 10 GRIFFIN MILLS WORK.

DELAMAR'S NEVADA GOLD MINING CO.,
SALT LAKE CITY, UTAH, Nov. 24, 1896.

BRADLEY PULVERIZER CO. *Gentlemen*:—In answer to your inquiry as to what the "Griffin Mill" is doing at our DeLamar Mill, DeLamar, Nevada, we beg to state that we often run 310 tons per day with 10 of your mills in operation, and on one occasion these 10 mills produced 408 tons in one day. I have no hesitancy in stating that they will regularly produce at least 30 tons per day each on our ore, which is extremely and unusually hard.

Yours very truly, H. A. COHEN, *General Manager*.

These strong letters coming from such representative men are conclusive evidence that we are right in claiming that the "Griffin Mill" will produce a larger amount of finer pulp at less cost than any other stamp or pulverizer made.

Let us send you a free copy of our illustrated pamphlet, which will tell you all about the Mill and bring to you other evidence of its great achievements.

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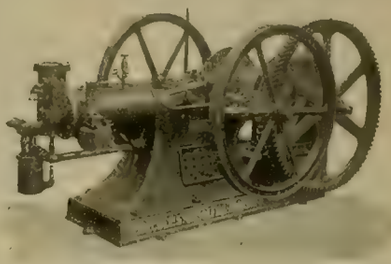
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Homestake Mining Company, South Dakota, $31,250; payable Feb. 25. The total to date is $6,118,750.

Hecla Consolidated Mining Company, Glendale, Mont., $15,000; payable Feb. 25. Total to date, $2,175,000.

Idaho Mining & Milling Company, B. C., $20,000; payable Feb. 25.

Elkton, Colo., $20,000; payable Feb. 20. The company has a cash reserve of $214,421.62.

Merrimac Mining Company, Nevada, Cal., 10 cents per share, $9400.

Boston and Montana Copper Company, $3 per share; payable Feb. 20th.

Victor, Col., 10 cents per share; payable Feb. 18th.

Santa Rosalia (Mexico) Company, 10 cents per share; payable March 1st.

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Recent California Mining Incorporations.

Sliger Con. G. M. Co., San Francisco; capital stock, $100,000—$50,000 subscribed; P. Maslin, Sacramento; W. H. Brown, E. A. Curtis, C. W. Keeney, San Francisco; W. P. Keeney, Oakland.

San Philipe Mining and Development Co., San Francisco; capital stock, $250,000—all subscribed; F. H. Loftus, C. V. Manner, L. Ph. Bolander, H. E. Gearon, L. R. Tuttle, of San Francisco.

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For Sale at a Bargain.

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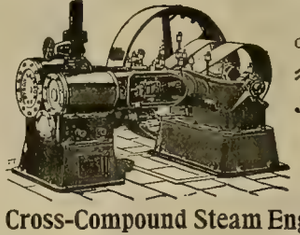
Hydraulic and River Miners Handling Boulders Can Easily Remove Them By Using

The Knox Patent Hydraulic Grapple.

IT WILL DO GOOD WORK AND GIVE SATISFACTION.

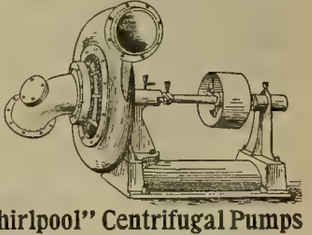
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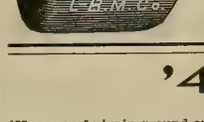
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In the jet propulsion wheel herewith illustrated, designed by S. J. Tutthill, of San Francisco, and manufactured by the Oakland Iron Works at Oakland, Cal., the impelling stream is not divided on striking the bucket, but entering tangentially to the curve of the bucket is entirely deflected in one direction alternately to the right and left with each succeeding bucket, thus, as claimed by the designer and manufacturers, "reducing to a minimum all tearing or separating of the stream, and incidental wasteful production of heat instead of work, while the alternating of the bucket discharge between left and right gives large clearance for the falling of the more or less completely spent water, and permits the nearest approach to a complete reversal of the direction of the stream without backwash. Any gain in clearance thus effected of course admits of a greater capacity for receiving water, and consequent greater output of power for a wheel of given diameter and speed.

"The shape of the discharge lip of the bucket is a radical departure from other makes, and is a recognition of the requirements of theory in accomplishing the reversal of the stream and absorption of its energy without serious loss incident to the impact resulting from the distorting of its section.



The usual flattening of the stream's section, and the discharging of it in a thin sheet along a lip of considerable length is in buckets of such a type a cause of very considerable loss of energy.

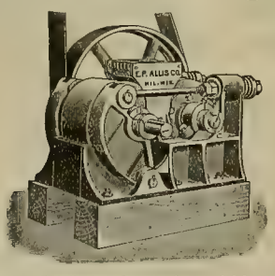
"In addition to the above points, the designer has given special attention to the form of the nozzle employed, and has adopted a form simple in design and directly in accord with the requirements for high efficiency as determined by scientific hydraulic investigators."

They conclude by saying: "It is evident that the successful embodiment in practice of the true theory for the correct design of impulse wheels, as accomplished in this particular wheel, must result in an unusually high degree of efficiency; and while no precise tests have as yet been completed for determining the degree of efficiency obtained, the results of approximate tests made on some of the considerable number of wheels already in use clearly indicate this to be another illustration of the truth of what should be an axiom among engineers, *i. e.*, the best practice is always the most perfect embodiment of sound theory."

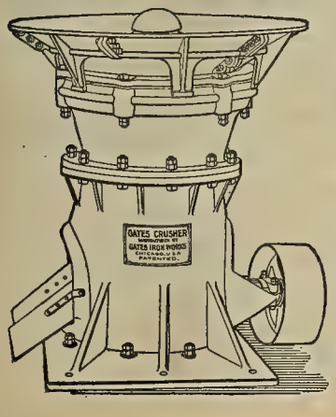
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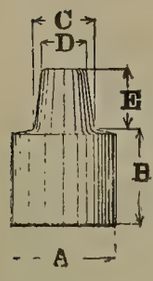
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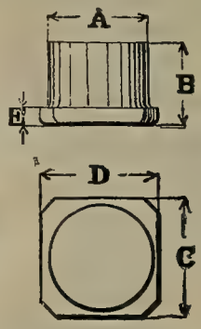
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List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING FEBRUARY 16, 1897.

577,225.—FRUIT JAR—S. S. Black, Pasadena, Cal.
577,349.—TWINE HOLDER—F. Bossong, Ellensburg, Wash.
577,353.—FRUIT GRADER—W. Brown, Portland, Or.
577,356.—SLUICE BOX—C. A. Christensen, Oretown, Or.
577,312.—ANIMAL TRAP—D. S. McCollum, Keno, Or.
577,145.—BEDSTEAD—C. E. McKeag, Los Angeles, Cal.
577,200.—ROWING DEVICE—J. Nordwall, Seattle, Wash.
577,062.—TRANSOM LOCK—G. M. Parsons, Carson, Nev.
577,070.—PAPER MOLDS—H. Sandham, Spokane, Wash.
577,274.—THILL COUPLING—J. U. Tabor, Los Angeles, Cal.
577,275.—FRUIT SLICER—M. Welch, Los Angeles, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ADJUSTABLE TRUCK.—Elias Ireland, Winters, Cal. No. 576,729. Dated Feb. 9, 1897. This invention relates to an improved truck which is especially adapted to be used in connection with an apparatus for bleaching fruits. It consists essentially of a truck having a vertically movable frame or body and means by which it may be raised or depressed at will so as to raise the platform-carrying trays from their supports in the bleaching house and transfer them to other points where they are left by the depression of the car frame. The movable frame is mounted upon the truck by means of arms having rule joints which connect the frame directly with the arms and a lever is fulcrumed upon the main frame, having its lower end connecting with a bar which is loosely journaled to the rear axle of the truck so that by the movement of the lever the frame may be raised or depressed.

TROLLEY SYSTEM.—W. G. Caffrey, Reno, Nev. No. 576,721. Dated Feb. 9, 1897. This invention relates to the general class of electrically propelled vehicles and to trolleys and electrical conductors, and it consists in a novel construction of the trolley and means for adjustably securing it to the vehicle. A positive and negative conductor are arranged in vertical plane, one above the other, and a trolley to travel in contact with the conductors, consisting of pivoted bars forming an extensible and contractible frame, slotted plates in which the frame bars are guided, contacts carried by the plates and removable and reversible arms pivoted to the plates with strings for holding their contacts up to the conductors. The extensible and contractible trolley, with its rollers and the cross rods on which the pivoted bars are guided, operate in conjunction with the trolley pole or cable and having a double joint between the pole or cable and the cross rods.

LAMPS.—Emile Boesch, San Francisco, Cal. No. 576,716. Dated Feb. 9, 1897. This invention relates to certain improvements in car lamps of that class which is adapted to be fixed in the side or end of a car so as to give light to the interior and exterior. It is also applicable to light streets or houses with various forms of burners known as argand or chimney burners, either for oil or gas. In the lamp fixture the body consists of a hollow vertical or side reflector, an extension chimney to which it is connected, said body having feed and exhaust passages and an air chamber on top, a removable fount having its lower part fitting into and over the said air chamber and provided with a burner and a glass chimney fitted to the burner, having its upper part fitting within the chimney extension. An air passage is made behind the reflecting surface and the lower part of the body projecting into the car forms an air chamber in communication with this passage, the chimney extension forming a communication to supply air to the passage.

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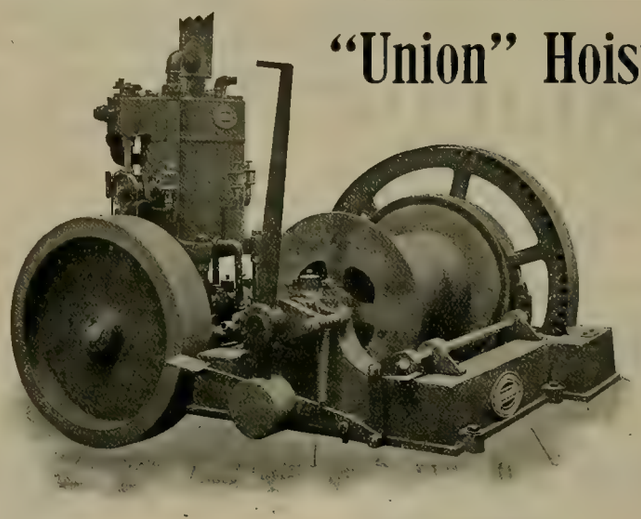
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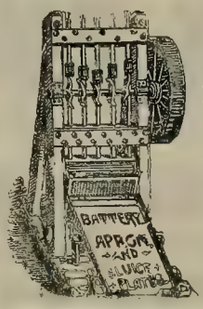
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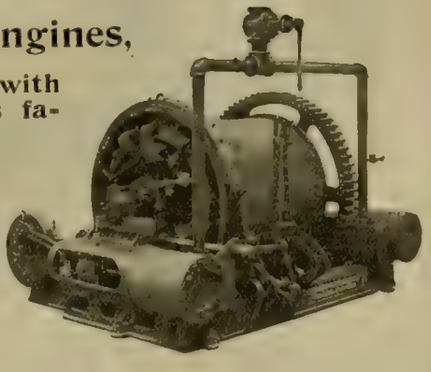
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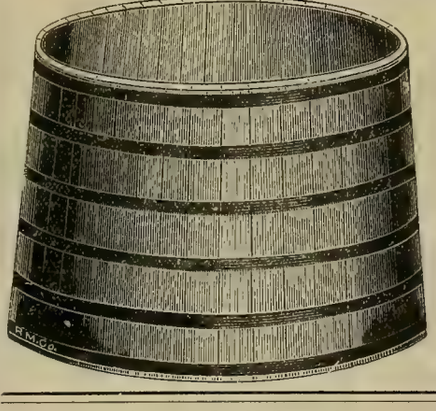
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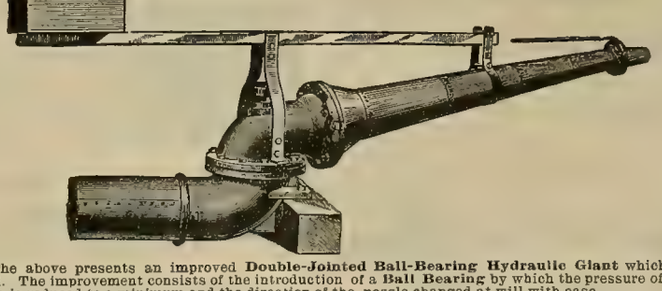
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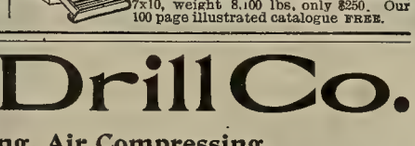
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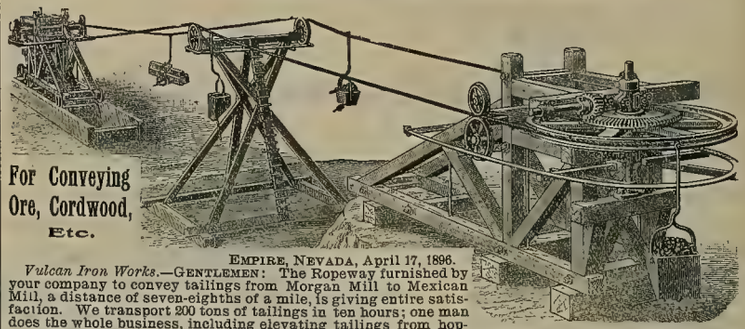
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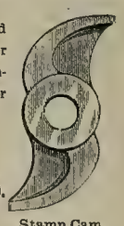
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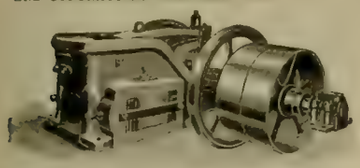
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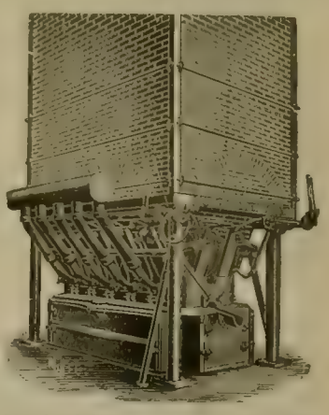
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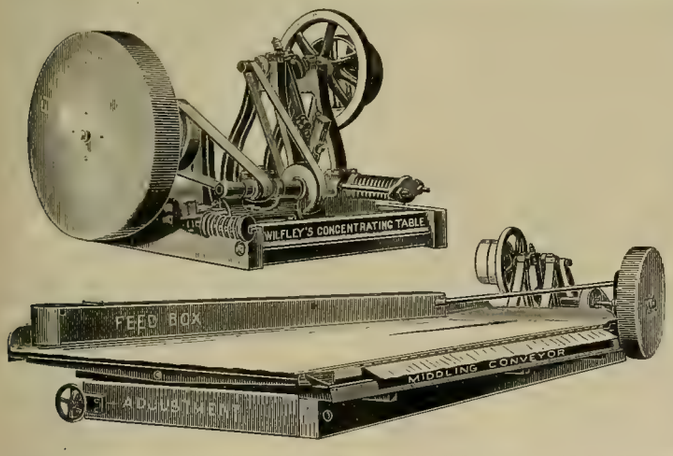
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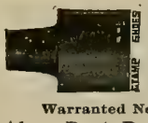
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Market Reports.

The Markets.

SAN FRANCISCO, Feb. 25, 1897.

With more settled weather and improving roads, business begins to enlarge, but no decided increase is looked for until after tax assessment day, when money will be offering more freely and dealers will not fear to stock up. The prevailing feeling with foundrymen and iron workers in general is that they will handle more orders this year than they did in 1895. They look for a large increased call for mill machinery, structural material, farm implements and different kinds of railroad material and machinery of all kinds for other industries and purposes. The low prices ruling for raw material is quite an incentive and admits of making lower bids on all kinds of work. Aside from this there is a strong probability that increased duties will be put on under the incoming administration, which will cause higher prices for imported raw material that will help those who laid in heavy stocks, until they are used up, before the increased duties.

In the local money market there is nothing new to report. After a week or ten days money will be offering freely, and, it is said, many persons and firms will avail themselves of the opportunity to get accommodations for new ventures or else to prosecute old ones. The premium on New York exchange has held firm, but towards the close the tone is easier. Before the close of March the premium on Eastern exchange will probably be gone and sales at par be the order. It is stated that new capital will soon begin to come in for investment, particularly for gold mining properties. Several sales are already being negotiated, which, it is thought, will be closed by the end of March. The railroads, it is reported, will make heavy disbursements for improvements, extensions, relaying of rails and new supplies. The East continues to report an easy money market, although it is noted by New York exchanges that more commercial paper is coming out, which is accepted as a favorable sign that the turn for the better has set in. Our New York correspondent writes: "A good authority on the money market says that there is getting to be more tone to the market for time loans, and he is of opinion that a gradual advance in the value of money may be looked for in the next few months. He bases this opinion first on the fact that a general improvement is unquestionably under way; which will gain strength as time goes on and cause a good demand for money from merchants and manufacturers. Secondly, he says that leading capitalists and other powerful interests have provided themselves and are still providing themselves with money in large blocks, according as opportunity offers. There is, of course, a plentiful supply of money for all needs at present, and there is likely to be plenty for some time to come; but an investment in long time loans just now, it is thought by many, might prove profitable.

New York Silver Prices.

NEW YORK, Feb. 25.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	29 11-16	64⅛
Saturday	29 11-16	64⅛
Monday	29 11-16	* ....
Tuesday	29¾	64⅛
Wednesday	29¾	64 13-16
Thursday	29¾	64¾

*Holiday.

	Copper.	Lead.	Iron.	Tin.
Friday	12 00	3 25	10 25@12 50	13 45
Saturday	12 00	3 25	10 25@12 50	13 45
Monday	*	....	.....	.....
Tuesday	12 00	3 20	10 25@12 50	13 35
Wednesday	12 00	3 25	10 25@12 50	13 45
Thursday	12 00	3 30	10 25@12 50	13 45

*Holiday.

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	25c Prem
New York Telegraphic Transfer	27½c Prem
London Bankers' 60 days	$4.86¼
London Merchants	$4.85
London Sight Bankers	$4.88½
Refined Silver, per oz., 1000 fine	64⅝
Mexican Dollars	51½@52

SILVER.—The market towards the close has strengthened slightly, in sympathy with better prices abroad. The improvement in London is said to be due to an increased call from India and the Straits. It is the impression abroad that China will soon come in as a freer buyer. In our market there is a continued fair export demand. The last steamer for China took out 32,000 ounces for Hongkong, but none for Japan.

MEXICAN DOLLARS.—The market has held to fairly good prices, but towards the close it is firmer, in sympathy with silver. The last steamer for China took out 188,676 dollars.

COPPER.—The market is practically unchanged. At the East there is a continued free outward movement, but increasing production in this country seems to be against an advance. The consumption in the United States is steadily enlarging.

The local market is quoted as follows:

Ingot, jobbing	14½@—
Ingot, wholesale	—@13½
Sheet copper	—@17
Bolt	½ & 5-16, 20c; ⅜ and larger, 17c

QUICKSILVER.—The demand is fair. It is stated that about all the outside holdings have been taken off the market. New York advices state that the market is strong at $37.50@38 per flask. Our market is quoted at $38 per flask. The export market is unchanged.

BORAX.—The outward move by water and rail is quite large. The last steamer for Panama took out over 50 tons for New York. Powdered is higher, and other sorts lower.

The market is quoted as follows:

Refined, in car lots	4¾
Refined, in sacks	5¼
Powdered, in car lots	5
Concentrated, "	4½

LEAD.—The market is firm at full figures, with the tendency to still better figures. The consumption abroad is steadily increasing, and it is expected that it will soon begin to enlarge in this country.

Our market is quoted in jobbing lots as follows:

Pig	3 75	@	3 85
Bar	—	@	4 00
Sheet	—	@	5 25
Pipe	—	@	4 50

SHOT.—There is a stronger tone to the market.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 20
Drop, B and larger sizes, " "	1 45
Buck, Balls and Chilled, do, " "	1 45

TIN.—Pig is steady, and plates irregular. Canners on the Columbia are getting their supplies from the East. In our market American is also finding quick sales. At the East it is said that there is still more or less cutting. The markets abroad are fairly steady.

We quote as follows:

Pig, per lb	14¼c@ —
Plate, I C coke, heavy, per box	$4 05@ —
" " " light, "	3 95@ —

IRON.—There is a fairly liberal spot stock of foreign pig on hand, with few shipments on the way. The very low prices ruling for American at the East is against foreign. The consumption in this city promises to be very heavy this year.

The Cleveland Ohio, *Iron Trade Review* says: Cheap raw materials in 1897 may prolong the present level, or something near it; but more regular operation of mills, when it comes, will at least bring more economical production, if markets are not materially higher. Structural steel has taken no noticeable start. The money requirements of the rail-buying campaign would tend to stiffen rates slightly on the projectors of building enterprises, but there seems no disposition to push matters, even under the present tempting discounts. From the Birmingham district comes reports of better sales in the week, one Southern pipe works having placed a fair order, while contracts of from 1000 to 3000 tons for foundry grades are noted. Foreign demand keeps up and recent transactions have netted 50 cents a ton more than sales for home consumption. A small sale of No. 1 foundry for shipment to Chili was made at $8.50, furnace.

AMERICAN.

	To Arrive.	Spot.
Sloss	$21 00	$23 50
Thomas	22 00	23 50
Salisbury	30 00	33 00

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—Large consumers and handlers do not anticipate wants beyond near-by months. They believe that, with a continuance of present brilliant wheat crop prospects, importations of coal will be heavy. Fears are entertained that the duty will be increased.

We quote as follows:

SPOT FROM YARD—PER TON.

Wellington	$8 00@— —
Greta	6 00@ 6 50
Nanaimo	6 50@ 7 00
Gilman	5 50@ 6 00
Seattle	5 50@ 6 00
Coos Bay	—@ 5 00
Cannel	8 00@— —
Egg, hard	12 00@13 00
Wallsend	— —@ 6 50

TO ARRIVE—CARGO LOTS.

Australian	5 50
Liverpool Steam	6 25
Scotch Splint	— —
Cardiff	6 25
Lehigh Lump	9 00
Cumberland	13 00
Egg, hard	10 00
West Hartley	6 50

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

ANTIMONY.—The market is fairly steady both here and at the East.

Our market is quoted at 7⅛@8c in a jobbing way. New York mail advices quote 7½c for Cookson's, 6¾@6¾c for Hallett's and 6½c for Japanese.

POWDER.—The market is unsettled, and, pending negotiations for higher prices, we take out prices. The different companies have combined to advance prices, which we will give next week.

NAILS.—The market is below the cost of production.

Wire, carloads, basis per keg	....		
" jobbing, " "	$2 20		
Cut, carloads, " "	....		
" jobbing, " "	2 00		

SPELTER.—The market is steady with a good movement. The East is reported firm, with a good demand ruling.

We quote our market in a jobbing way at 5 cents a pound.

NICKEL ANODES.—The demand the past week was fair. The East reports a slightly improved call.

We quote in a jobbing way at 60 to 65 cents a pound.

PLATINUM.—The inquiry is said to be fair, both here and at the East.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC.—Dealers report an improved call the past week.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady. We quote in jobbing lots at 50 cents per pound for ingots.

BISMUTH.—The East reports an increasing call; our market is steady.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is steady to firm.

We quote in a jobbing way at 70 to 75 cents per pound.

Chemicals.

There has been a continued fair demand for the season of the year. The general impression is that quite an increased consumption will rule this year.

BONEASH.—There is a good demand but chiefly for export, with Australia drawing liberally.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is reported quiet but firm at 2½c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is slow but steady at $1.50 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a fair demand at 2½c a pound from stores.

NITRATE OF SODA.—The market is essentially unchanged. At the East there is continued activity at from $1.87½@1.90 for commercial. Chili advices state that the market is active at $3.90 per 100 pounds for 95%. Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is quiet at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported steady from store at 6½c per pound in carboys.

SULPHURIC ACID.—The demand is light. We quote in a jobbing way at 1½c per lb for 66%.

BLUE VITRIOL.—Eastern advices state that the market shows more activity. Our market is quiet.

We quote in a jobbing way at 4½c per pound.

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.		Secretary.
Alma G M Co, Cal	1	5c	Feb 9	Mar 13	Mar 29	D Gutmann, 320 Sansome
Andes S M Co, Nev	43	10c	Feb 1	Mar 8	Mar 31	Jno W Twiggs, 309 Montgomery
Best & Belcher M Co, Nev	61	25c	Jan 26	Mar 2	Mar 23	M Jaffe, 309 Montgomery
Confidence G M & M Co, Co	1	10c	Jan 19	Feb 27	Mar 20	F Aureguy, 320 Sansome
Con Imp M Co, Nev	38	1c	Feb 15	Mar 23	Apr 13	C L McCoy, Mills Bldg
Eureka Con Drift M Co, Cal	7	5c	Jan 20	Feb 26	Mar 20	D M Kent, 330 Pine
Eureka Con M Co, Nev	14	25c	Jan 18	Feb 23	Mar 15	H P Bush, 134 Market
Gold Hill M Co, Cal	11	25c	Jan 8	Feb 15	Mar 4	C A Grow, Mills Bldg
Jamison M Co	9	5c	Nov 27	Mar 26	May 21	Sam W Cheyney, 120 Sutter
Julia Con M Co, Nev	28	5c	Jan 21	Feb 26	Mar 19	J Stadtfeldt Jr, 309 Montgomery
Marguerite G M & M Co, Cal	5	10c	Jan 14	Feb 25	Apr 8	Chas Peach, 237 Twelfth
Mineral Hill M & S Co, Cal	1	5c	Jan 4	Feb 15	Apr 13	Chas Peach, 210 Sansome
Occidental Con M Co, Nev	26	10c	Feb 10	Mar 16	Apr 6	A K Durbrow, 309 Montgomery
Ophir S M Co, Nev	70	25c	Feb 5	Mar 10	Mar 30	E B Holmes, 309 Montgomery
Reward G M Co, Cal	18	2c	Feb 6	Mar 11	Mar 27	S W Backus, Mills Bldg
Thorpe M Co, Cal	5	5c	Jan 13	Mar 22	Mar 29	A F Frey, 44 Phelan Building
Troy M & D Co, Alaska	3	10c	Feb 2	Mar 9	Mar 26	O Eyst, 421 Mission
Utah Con M Co, Nev	24	5c	Jan 14	Feb 17	Mar 8	A W Havens, 309 Montgomery

Mining Share Market.

SAN FRANCISCO, Feb. 25, 1897.

The market has been only spasmodically active the past week under review. It acts different from any previous movement and therefore is a puzzle to those not informed. Con. Virginia has been used as a lever for working the market; but, judging from how the moves have been, it ought to take a back seat and something else come to the front, for evidently it is hardly time to let the "bottom out" of the entire list, for too many assessments have to be collected within the next few months. Aside from this, the gathering of sports in Nevada to see two persons have a prize fight will afford an opportunity to unload a considerable quantity of shares at a profit on current prices. Whether this will be done the writer has no way of finding out, but it is reported on the street that this is the program. Those who have long experience in stock gambling do not believe that much of a bull movement can be made at that time, and, as for that, at any other time without showing up a body of ore which gives promise of yielding enough bullion to admit of dividends being paid. Moneyed outsiders are not caught as easily as they were in years gone by or before so much notoriety was given to the way in which a large number of the mines have been mismanaged. It is stated that persons connected with the inside pool have succeeded in forming a company and elected directors for the purpose of draining the American Flat mines. It is reported that the company is incorporated under the laws of Nevada. If this is so, then it will probably be run like the Yellow Jacket. This mine does not make reports, or at least none are seen in this city, to the shareholders regarding work or financial standing, owing to the company not having been incorporated under the laws of California, therefore money can be misappropriated and no one outside of the ring be the wiser.

From the Comstock mines the use is not calculated to inspire the hopes of the long-suffering assessment-wracked shareholders, who have visions of untold wealth to be theirs when the powers that be get ready to show up two or more large bodies of ore found years ago but kept in reserve for the future. It is this belief which makes assessments comparatively easy to collect, and has heretofore helped no little in promoting by a bull move. In Utah they are still running an east crossdrift, and with as little prospects of striking ore as at any time within the past quarter of a century. An assessment, and as

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for that quite a number, is liable to be struck first. In Sierra Nevada there is no change in the work or formation from that reported last week. The same remarks apply to Union, with the exception that in the latter a vast crossdrift has been started on the 900-foot level. The official letter from Mexican reports that in the west crossdrift a light seepage of water is coming in. On the Central tunnel level of Ophir they are opening out some old works. In one of these they have made the big strike of 4 inches of ore assaying $30. It is not reported in the letter if it required a magnifying glass to locate this ore. On the 1000-foot level the west crossdrift is in more favorable formation. On the 1000-foot level of Consolidated Virginia they have suspended work to the west, and started an east crossdrift from the Consolidated Virginia shaft. On the 1550-foot and 1650-foot levels the work seems to be largely preparatory, and therefore uninteresting. More active exploring work ought to be commenced soon.

Nothing of much consequence has been discovered yet. From the 1750-foot level there is nothing new to report. The total extraction of ore last week was 78 tons, assaying over $30 to the ton. There is no change to report in the work in Best & Belcher and Gould and Curry, and also in Savage. In Hale & Norcross work is about the same as reported last week. Chollar is not doing any work. In Potosi they are still fooling away time on the upper levels. In Bullion the long north drift is being pushed slowly ahead. It is said that slow progress is made so as not to strike ore. And it is said the same persons that control this mine want to get control of Hale & Norcross. No work is being done in Julia or Exchequer, outside of the laborious duty of collecting an assessment by the former. In Alpha they continue to experiment how not to find the west lode. They have, so far, been a great success at it, and will probably continue to be until the inside has frozen shareholders out of their holdings.

Reports to hand state that in the joint west crossdrift run by Con. Imperial, Challenge and Confidence, the formation has changed decidedly for the better. It is softer and looks well. At last advices there was quite a flow of water. The work in Confidence is unchanged. No news from Challenge or Yellow Jacket. The official letters from Belcher and Seg. Belcher have not been changed for the better. Raising of ore is reported, but no particulars are given. Those in position to know say that a big body of good to rich ore is being developed, and that is why the letters do not give any information as to the work. In Crown Point the work is practically unchanged from last week's advices. Advices from Overman, Caledonia and Alta are practically unchanged since our last week's issue.

From the Brunswick lode there is very little of interest to report. Work in Occidental is being done on the several levels heretofore reported. The formation is practically unchanged. In Chollar a good excuse presented itself last week to stop extracting ore, viz: too much snow, but the south drift on the 500-foot level is being pushed ahead. At last advices they were in Chollar ground with favorable formation encountered, but no ore of much value is expected to be struck yet awhile. The work being done by Savage, Best & Belcher, Gould & Curry, is on the same levels and in the same directions reported last week.

The market strengthened this morning under the lead of Confidence, which sold up to $1.05 a share, against 82 cents bid yesterday. The advance is said to be due to some ore or quartz shown at the Confidence office, which, it is stated, came out of that mine from the west lode. There are some who think a Comstock superintendent, who has just returned from Randsburg, brought the specimens. It seems as if "pocket miners" still exist. The Gold Hill mines will have to levy assessments soon.

The following illustrates the changes of the week:

MINES.	Feb. 18.	Feb. 25.
Alpha	$ 06	.....
Alta Consolidated	04	.....
Andes	11	$ 12
Belcher	22	24
Best & Belcher	62	57
Bodie	.....	.....
Bullion	11	12
Challenge	36	.....
Chollar	.....	94
Confidence	83	1 05
Consolidated California and Virginia	1 90	2 00
Consolidated New York	.....	.....
Crown Point	.....	.....
Exchequer	.....	.....
Gould & Curry	90	.....
Hale & Norcross	1 05	.....
Justice	.....	.....
Mexican	34	.....
Ophir	80	81
Overman	10	.....
Potosi	42	44
Savage	40	38
Sierra Nevada	34	.....
Union	33	.....
Utah	.....	07
Yellow Jacket	25	30

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Rainfall and Temperature.

The following data for the week ending 5 A. M., February 24, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week.	Total Seasonal Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date.	Average Seasonal Rainfall to Date.	Maximum Temperature for the Week.	Minimum Temperature for the Week.
Eureka	.....	.....	24.89	28.84	52	30
Red Bluff	1.32	20.56	13.83	18 40	56	30
Sacramento	.94	14.19	14.40	13.97	54	34
San Francisco	0.75	17.77	12.43	17.25	57	38
Fresno	0.40	8.33	4.09	4 50	56	32
San Luis Obispo	2.10	17.13	12.25	.....	66	28
Los Angeles	3.00	14.33	5.91	14.96	62	36
San Diego	1.90	9.32	4.44	7.66	64	38
Yuma	.06	4.72	0.46	2.49	74	38

San Francisco Stock Board Sales.

SAN FRANCISCO, February 25, 1897.

9:30 A. M. SESSION.

200 Belcher	23	200 Ophir	.....	81
200 Bullion	12	100 Savage	.....	38
125 Con Cal & Va	2 00			

SECOND SESSION—2:30 P. M.

300 Ophir	79	200 Belcher	.....	24
50 Best & Belcher	57	100 Confidence	1	05
100 Chollar	94	100 Utah	.....	07
200 Potosi	44	100 Andes	.....	12
400 Yellow Jacket	30			

Assessment Notices.

MINERAL HILL MINING AND SMELTING CO.—Location of principal place of business, San Francisco, California; location of works, Spenceville, Nevada County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 4th day of January, 1897, an assessment (No. 1) of five cents (5c) per share was levied upon the whole of the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 210 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of February, 1897, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 25th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. PEACH, Secretary.

Office—210 Sansome street, San Francisco, California. Office hours from 1 to 3 o'clock P. M.

POSTPONEMENT.

At a meeting of the Board of Directors of the Mineral Hill Mining and Smelting Company, held on the 15th day of February, 1897, it was resolved that any stock upon which the assessment shall remain unpaid on the 15th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on TUESDAY, the 13th day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

CHAS. PEACH, Secretary.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 18th day of January, 1897, an assessment (No. 5) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of February, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors the date of delinquency of the above assessment is postponed to the 22nd day of March, 1897, and the day of sale to MONDAY, the 29th day of March, 1897.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

ANDES SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia City, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of February, 1897, an assessment (No. 43) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 20 and 22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of March, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 31st day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Rooms 20 and 22, Nevada block, 309 Montgomery street, San Francisco, California.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9), of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY. Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

BEST & BELCHER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the 26th day of January, 1897, an assessment (No. 61) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 2nd day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on TUESDAY, the 23d day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

M. JAFFE, Secretary.

Office—Room No. 33, Nevada block, No. 309 Montgomery street, San Francisco, California.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Silver Star Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 10th day of February, 1897, an assessment (No. 26) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 16th day of March, 1897, will be delinquent, and advertised for sale at public auction, and, unless payment is made before, will be sold on TUESDAY, the 6th day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURROW, Secretary.

Office—Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

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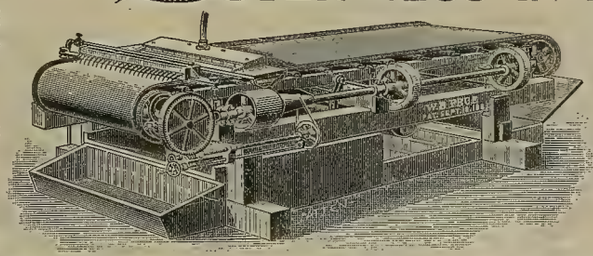
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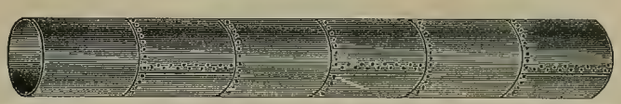
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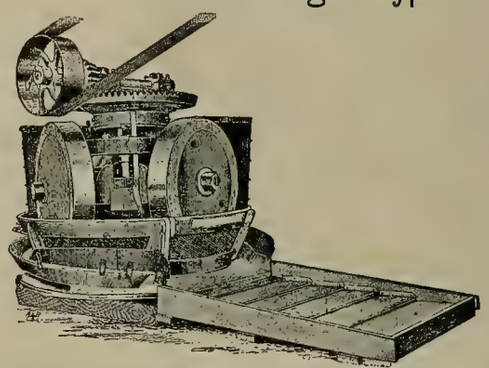
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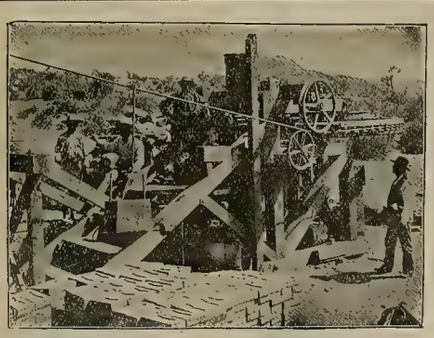
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AND PACIFIC ELECTRICAL REVIEW.

No. 1913.—VOLUME LXXIV. Number 10. SAN FRANCISCO, SATURDAY, MARCH 6, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Problems of the Rand.

The mine owners of the Rand in South Africa have fallen upon hard times. Between the unreasonable restrictions, monopolies and duties of the Boer Government, and the lowness of the grade of their ore, many of the big mines are finding it difficult to make both ends meet and some have already closed down. Others will soon work out their reefs to such a depth that the difference between cost and production will get on the wrong side, unless the concessions asked for from the Boers are granted. That these concessions will be granted there can be little doubt, for the Boers have no desire to see the mines closed, but unless they change their methods the concessions will be so loaded as to be of little real value.

Much has been done for the mining world in the Rand in the way of introducing cheap methods. Necessity has been the cause of this. Now the great problem with all the mine managers is still further reductions. John Hays Hammond, consulting engineer of the Consolidated Gold Fields who control several of the largest mines, has lately left London for the Rand. His main purpose is to see what can be done in the way of starting up again some of the properties closed down and increasing the profits of others. It is hardly probable that much can be done immediately, except in the way of consolidation. In an interview before leaving London Mr. Hammond said: "If you work your property with a small plant, not only is the aggregate profit reduced but the mere fact that mining is spread over a longer period of time means the enormous loss of interest on the capital invested and upon the gold output as well."

What Mr. Hammond says seems almost self-evident, yet all over the world are mine owners attempting with small plants to duplicate the figures of costs of working in the Treadwell or the Homestake. What has been done in Africa will in time influence mining here largely, especially in the direction of working low-grade ores and sinking to great depths.

The American Flat Tunnel.

It seems probable that the scheme for draining the mines of American Flat by an extension of the Sutro tunnel will be carried out. A corporation is being formed in Nevada, with Virginia City as its principal place of business, which will in a few days file its articles. The name of the corporation is the American Flat Development Company, and the seven directors chosen to form it are H. M. Yerington, W. E. Sharon, J. W. Eckley, H. M. Gorham, E. D. Boyle, Albert Lackey and J. R. Ryan.

The capital stock is placed at $10,000,000, and the purposes of the incorporation, as stated in the articles, give it wide scope for work and include the owning and working of mines, controlling of water supplies and utilizing them, generating electric power and doing any kind of milling or reducing of ores, etc.

It is announced that the work of running an extension from the Sutro tunnel to the Rock Island shaft will be commenced first. This extension, it is proposed, will go through the Alta mine, starting from the shaft, and will be about 7500 feet in length. From the Rock Island shaft a lateral drift is to be run from the Caledonia mine on the north to the Winnie claim on the south. It is understood that the people forming the company control 15,000 linear feet of ground which will be drained by this system of tunnels.

While the first great drain tunnel for mining—the Sutro—was built on the Comstock, there has been much more activity in running similar, although not as extensive, tunnels in other districts of late years, especially in Colorado and Utah. In those States many of the enterprises have been successful and others now in course of construction promise to yield good returns.



NEW MEXICO TURQUOISE PROSPECTORS.



THE CHALEHA, N. M., TURQUOISE MINE.

(See page 192.)

It is to be hoped that this enterprise will be freed from the old unbusiness-like methods that were so much in vogue on the Comstock during its halcyon days. If so, it may instill new life into what has been the greatest of all mining camps. Certainly, the fact that such men as are connected with the scheme have faith in it says much for it.

The Mining Bureau Appropriation.

The Ways and Means Committee of the California State Senate has recommended that the annual appropriation for the State Mining Bureau be cut down from $25,000 to $12,500. This is a poor way to economize. The amount proposed would be nearly all eaten up by the salary of the State Mineralogist, the rent of the Bureau, and the expenses of maintaining the Museum in San Francisco, and very little, if any, would be left for work in the field. The best work done by the Bureau in the past has been in gathering data of value to miners and preparing articles on special subjects, all of which has been printed and supplied free of charge to those desiring it. That there has been a demand for this literature there can be no question; that it has filled a want is shown by the fact that, although larger editions of the Mining Bureau's reports and publications have been printed than those of any other State bureau or institution, they have always been speedily exhausted. Second editions of several of the valuable bulletins have been printed to meet the demand.

The maintenance of the Museum has been of value, partly for those who come to this city and desire to gather information from it, but much more for the use of those connected with the Bureau in preparing their data. If these men can no longer be employed the main object for maintaining the collection of minerals and especially of the laboratories will be gone.

It seems strange that, with all the renewed interest in mining and the importance of the industry to the State, the mining members of the Legislature cannot see to it that the comparatively small appropriation of $25,000 is made. It is the old story—miners ask for and receive from the State less than any other class for their industry.

But little effort made by the Miners' Association or others interested would be necessary to show to the members of the Legislature that the State of California can in no other way make a better investment. It is not as if mining was asking for direct aid, as do so often other industries that are languishing.

To Protect Stockholders.

Up to the first of this week the only bill that was passed by both houses of the State Legislature of California in reference to mining was an act to amend sections 1 and 3 of the act of April 23, 1880, for the protection of stockholders in mining corporations. Section 1 is amended so that the superintendent shall file with the secretary of the company monthly instead of weekly reports.

The third section is amended so that in case the president shall refuse or neglect to give to any shareholder an order to examine the mine owned by the company such stockholder shall be entitled to recover against the president $1000 and costs. In case of the failure of the directors to have the reports and accounts current made and posted they shall be liable, either severally or jointly, to an action by any stockholder in any court of competent jurisdiction complaining thereof, and on proof of such refusal or failure such complaining stockholder shall recover judgment for actual damages sustained by him, with costs of suit. And each of such defaulting directors shall also be liable to removal for such neglect.

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J. F. HALLORAN.....General Manager

San Francisco, March 6, 1897.

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The State Lands.

There should be no further argument required in favor of repealing the act of the Legislature of March 28, 1874, and subsequent acts amendatory of it, providing for the sale of mineral lands in the 16th and 32nd sections, granted by the Federal Government to the State, than is contained in a letter that the Surveyor-General of California has forwarded to Mr. Soward of the Assembly. The act has been declared by the United States and the State Supreme Court void and simply waste material. Yet the Surveyor-General writes that no less than nineteen applicants for patents to 40 acres of land each in the Randsburg district have filed papers in his office under this act. They have no doubt acted in good faith and probably have, some or all, been the original locators. Others, however, who, knowing that such claims are not valid, and that the lands being mineral belong to the Federal Government yet, have located them under the Federal Statutes and local regulations and will obtain title.

In conclusion, Mr. Wright says that to permit the present law to remain in its present form will cause much complication and litigation over mining titles, derived from two different sources under systems so different and so at variance with each other as are the United States law and the State law.

The Debris and Dredging Bills.

The Legislature has passed the so-called debris and dredging bills. The former carried with it no new appropriation—merely reappropriating $250,000 now in the State treasury and making it available. It will be expended under the direction of the United States Debris Commission, with a like amount appropriated by the Federal Government for the building of dams for restraining debris. That the expenditures will be honestly made there can be little doubt, and the fact that the commission has had now several years to consider the questions relating to the debris dams is guarantee that the work will be carried out intelligently and to good purpose.

The dredging bill carries with it an appropriation of $300,000 for dredging the Sacramento river. While it is true that this work should have been undertaken by the Federal Government, this appropriation by the State will no doubt induce Congress at the next session, if proper representations are made, to make as large or greater appropriations, and in the end the State will have made a good investment through forcing the Federal Government to do more than it would otherwise for the Sacramento river. In the meantime, it is to be hoped that the State authorities in charge of the work will do good work. Could they delay fixing upon final and permanent plans until the Federal Government steps in and joins the State in the improvement of the river, probably there would be better returns made with the money.

Good Roads to the Mines.

If any one is skeptical about the advantages of the proposed changes in the system of building and caring for roads in this State, he should take a trip this month up through Calaveras, Tuolumne, Amador or any of the mining counties in which there is activity in that industry and ride over the roads over which supplies and machinery must be taken to the mines. Many of these roads—thoroughfares—leading to rich mining districts are impassable except for very light wagons or buggies. Others will permit the passage of freight wagons with such small loads that the charges are almost prohibitive.

In all the depots on the way to the mines may be seen machinery and supplies held up until the roads improve. In Calaveras there are six mines which one company expected to begin development work in three months ago, but have been prevented from doing so because the roads would not permit the hauling in of the necessary machinery and supplies. In nearly every district along the Sierra Nevadas in which there has been increased activity in mining of late years the roads are so bad that business is at a standstill. Some mines obtained their supplies in season, but many others could not and are consequently idle. The machinery for dozens of mills and for scores of proposed shafts is scattered along the foothills, at railroad depots or part way to their destination on the roadside. Could it all have gone in when ordered there would now be many men employed who are idle and many thousands saved to the mine owners.

This has been an unusually bad year for the roads as far as the weather is concerned, and far worse because of the increased amount of machinery and other supplies that has been required on account of the opening up of new mines. The utter inadequacy of the roads has been shown and it has been a very expensive lesson. It would be safe to say that in many districts the losses entailed directly through the wretched condition of the highways in this one winter would more than pay for the building of good, well-paved and well-drained roads.

The mine owners and the working miners, who suffer through curtailment of employment, should together be able to see to it that the supervisors of their counties do their duty or see that capable and honest men are elected to the boards.

The Immigration Bill and British Columbia.

The veto of the immigration bill by President Cleveland will in one respect be of great value to the American miners of the Northwest. A majority of those engaged in mining in British Columbia are American citizens. Most of the rich mines are owned by people from Spokane and other parts of Washington and from Idaho and Montana, and, from the liberal laws of the province, one not a subject may take up claims and foreign corporations are given all privileges. When the immigration bill, including certain restrictions as to Canadian laborers coming into the Eastern States, was passed by Congress, there was considerable talk of retaliation in British Columbia. While the papers published in that province showed a very liberal spirit, there was yet danger that some measures would have been passed that would tend to do away with the extremely good relations now existing between the miners of the Northwestern States and British Columbia. Large numbers of Canadians have come into those States to engage in business, and the recent development of the mineral resources of British Columbia has drawn even greater numbers of Americans across the border, and they have been received in the broadest and most liberal spirit.

It is to be hoped that any future attempts at legislation against foreign immigration will not be directed against a people with whom we have so much in common as the Canadians.

Geology of the Sierras.

The U. S. Geological Survey has done more work of real value in California during the past year than ever before. The importance of the work from an economic standpoint and the value of the field in the eyes of the scientist for geological investigation have been the incentives to Director Walcott. References have been made in these columns to the folios issued by the Survey, covering different areas, geologically and topographically, and especially to the late publication, the "Nevada City Special Folio."

Now there has been published "Further Contributions to the Geology of the Sierra Nevadas," by Henry W. Turner, a most comprehensive work, devoted to the central Sierra Nevada region.

It forms a part of the forthcoming seventeenth annual report of the U. S. Geological Survey, and embraces about 500 pages. The paper is illustrated with a large number of photographic reproductions which are of much general interest, and in addition many plates representing peculiar and interesting rocks. The latter are, however, of interest chiefly to the technical geologist.

The report contains, as was to be expected, much valuable matter for the special student, but there is also a large amount of information which is of value to the miner and general reader who takes any interest whatever in the history of California's great scenic mountains.

The most important work of the Survey upon the gold belt is now nearly completed, but it seems evident, from the fact that the whole area of these mountains is marked off for topographic sheets, that the geological mapping is to be extended southerly into the higher Sierras and eastward toward Nevada, which will involve many years of work.

In the present paper Mr. Turner discusses the general history of the Sierra Nevadas, the possibility of the presence of Archæan rocks, and in considerable detail the character and classification of the igneous rocks. The main portion of the paper is, however, given up to a discussion of the different atlas sheets, including the Chico, Bidwell Bar, Downieville, Sierraville, Jackson, Sonora, Oakdale, Merced–Mariposa, Big Trees and, more briefly, the Dardanelles, Yosemite and Mt. Dana areas, which are not yet mapped.

For those areas which lie in the main gold belt Mr. Turner discusses the geological features under two heads.

(1) The superjacent series, including the alluvial, glacial and lake deposits and other beds of Tertiary age, many of which are valuable because of the presence of gold. The volcanic rocks are an important feature of the superjacent series from an economic standpoint, as they cap in many instances the old river channels.

(2) Under the head of subjacent series is treated the auriferous slate series proper and the various kinds of pre-Cretaceous igneous rocks which form the main body of the Sierra Nevadas. In this connection the geology of the mineral deposits is discussed.

Owing to the fact that the United States Geological Survey has done so much in the Sierras, and expects to do more, and that the maps and reports are in part sent free upon application, it would seem that it would be very advantageous for miners and others who are interested to become fairly familiar with the more important geological terms and theories which are so clearly given in this as well as in other reports. The region concerned is destined to grow more important from an economic standpoint as the years pass, and the ability on the part of those interested in mining to appreciate the larger geological questions will be of much practical value as well as give personal satisfaction.

Although several distinct parties have been carrying on geological mapping in the Sierras, their conclusions are generally in harmony, and must result in a vast amount of practical benefit. In the present paper there is nothing particularly new advanced, unless it is the theory that many of the gneisses and schists are of Archæan age. Up to within recently there has been some question as to whether these most ancient of rocks occur in California, but it is becoming more probable that they exist not only in the Sierra Nevadas, but in parts of the Coast ranges, as well as in the southern part of the State.

Concentrates.

A LEDGE of copper ore has been discovered near Randsburg, Kern county, Cal.

ESTIMATES of the copper output of Arizona for 1896 place it at 63,333,788 pounds.

SOUTHERN PACIFIC surveyors are at work between Mojave and Randsburg, Cal.

A TELEGRAPH LINE from Kramer to Randsburg, Cal., was put in operation last week.

THE discovery of a deposit of tin ore is reported near Granite, Grant county, Oregon.

THE Colorado militia bill for services at the Leadville strike aggregates $200,000.

AT Randsburg, California, the Excelsior claim has been sold to Brown and Shinn of Colorado for $15,000.

THE owners of the Undine mine at Tintic, Utah, have been offered $6000 a month for the water from the mine.

SIX new quartz mills will be erected near Grants Pass, in southern Oregon, as soon as the rainy season is over.

A DISCOVERY of a body of copper ore is reported from Glendale, southern Oregon, which carries copper and gold.

THE Wedge Mining Company, whose properties are in the Randsburg district, Cal., has been incorporated in Denver, Colo.

REPORTS of discoveries of high-grade ore seventy-five miles north of Yuma, Arizona, has caused considerable excitement there.

IN the vicinity of Gold Creek, Elko county, Nevada, some 200 quartz claims and 10,000 acres of placer ground have been located.

AN appropriation of $5000 a year for five years by the Washington Legislature for a geological survey of that State is being advocated.

THE Butte mine at Randsburg, Cal., has been sold to a San Francisco syndicate for $120,000, a first payment of $20,000 having been made.

A LARGE deposit of what is said to be a good quality of marble has been discovered on the desert about twelve miles from Victor, San Bernardino county, Cal.

IN anticipation of the opening of the Uncompahgre reservation in Utah a number of people who want to take up gilsonite or asphaltum beds are already on the scene.

THERE is in contemplation a consolidation of the Mollie Gibson, A. J., Deep Shaft and Franklin mines, which would make one of the greatest mining enterprises in Colorado.

THE Le Roi Mining Company, at Rossland, last week started up its new 40-drill compressor. The engine, of 450 H. P., will work the pumps and hoists, as well as the compressor.

A BILL is before the Utah Legislature providing that notices of location shall be filed with the county recorder instead of the recorder of mining districts, as has been the custom.

THE owners of the Payne mine, in the Slocan, British Columbia, will put in a tramway this season 7000 feet in length, over which 100 tons of ore daily will be shipped by gravity.

THE California Exploration Company is sinking shafts or running tunnels on six mines in Calaveras county, Cal., the Bund, Burgess, Gottschalk, Golden Hill, Vire and Maloney.

SOME Butte, Montana, mining men have obtained options on a tract of coal lands in the Clark's Fork county, near Red Lodge, with the idea of supplying the product to smelters in Butte.

CAPTAIN J. B. DE LAMAR, in January, secured an option on a majority of the stock of the Mercur mine in Utah at the rate of $3,750,000 for the whole property, but has given it up after examination.

SEVERAL large placer claims are being fitted up by capitalists in the John Day country in Oregon. Ditches built as long ago as 1862 are being reopened and considerable machinery has been sent in.

IN the California State Senate last Tuesday, on motion of E. C. Voorheis, the Assembly joint resolution advocating the passage of the California mineral land bill by Congress was passed by a vote of 32 to 0.

SAN FRANCISCO capitalists, represented by J. J. Fowler, have bonded the Red Mountain copper mine, near Ukiah, Cal., for $10,000. The mine was discovered and worked a little some twenty-five years ago.

IT is contemplated by Salt Lake and Ogden people to erect an electric power plant on the Bruneau river and transmit 2500-horse power to the Oro Grande mines, lying between the Bruneau and Owyhee rivers.

THERE are said to be twenty-five paying mining properties in the Silver Star district, Esmeralda county, Nevada. That county, with a production of $360,000 in gold in 1896, was second in the list, Lincoln being first.

LAST WEEK a sale of ten shares of Calumet and Hecla stock was sold in Boston at $370 a share—the highest price on record. This is at the rate of $37,000,000 for the whole of the stock of this great copper property.

THROUGH the efforts of the Chamber of Commerce of Aspen, Colorado, such reductions in freight rates and royalties have been made on the silver ores of the district that the output promises to be larger than that of 1896.

B. R. SWEETLAND, Tucson, Arizona, sends an argument that iron is the base of charcoal, and that carbon is not an element, and suggests that the word "ferri" be substituted for "carbon" in chemical nomenclature.

THE owners of the Kennedy mine at Jackson, Amador county, Cal., are making arrangements to put up more powerful hoisting works over the north shaft, capable of sinking 1000 feet deeper than the present deepest level.

THE Gold Creek, Nevada, *News*, describing the mica mines in the Ruby mountains in Elko county, says that they crop out here and there through the crest of the mountain for a distance of sixty miles, and is of the best quality.

NO LESS than 170 miners perished in the Zanamoro mine at Zacatecas, Mexico, last week. A fire broke out and the men were suffocated. The principal shaft is 3300 feet deep, and proper precautions had not been taken for means of escape in such cases.

A CABLE from Yokohama announces that the Japanese Government has decided to adopt the gold standard, at a ratio of 32½ to 1. The smallest gold piece will be of the value of five yen. The silver yen will gradually be withdrawn. The new law comes into operation in October.

W. S. WOOD, of the Gulf Railway Mining Company bureau, has gone to Hartville, Wyoming, to make an examination of the iron ore alleged to be in existence there, to develop which it has been proposed to build a branch railroad connecting with the Gulf system at Orrin Junction.

AT the De Lamar mine in Idaho the wages of miners were reduced from $3.50 to $3 per day February 1st. The mine is not paying as well as formerly and the management announces that the utmost economy will have to be exercised in order to keep the property in operation.

MISS SCOTT of Boise City, Idaho, is the owner and manager of the General Pettit mine, near the old Atlanta, and in which there is said to be $750,000 worth of ore blocked out. She has lately been investigating different methods of working the ores, with a view to putting up a large plant.

THE Elkton Consolidated mine of Cripple Creek, Colorado, is a good example of what can be done in the way of making profits in a big mine. Since March, 1896, the value of ore mined has been $539,000, and of the proceeds $355,000 has been clear profits. There is in sight ore valued at $600,000.

THE output of the Arizona Copper Company, at Clifton, for December last was 437,424 pounds of copper and 624,798 pounds of matte. The total output of this company for the year 1896 was 7,572,376 pounds of copper and 7,679,462 pounds of matte, a monthly average of 531,041 pounds of copper and 630,071 pounds of matte.

ENGLISH lead mines in Northumberland and Cumberland, which have been worked in an old-fashioned way for centuries, have been taken hold of by a Belgian company, who have put in a large number of extra hands and are spending considerable money in development and metallurgical machinery.

THE Quincy, Mich., Mining Company are credited with intention to erect a smelting plant of their own to cost $75,000, to be ready for operation when the present contract with the L. S. Smelting Company expires in 1898. The new plant is to be located near the stamp mill on Portage lake, to which they will also build an addition.

IT is announced by the Jacksonville, Oregon, *Times* that a syndicate formed by Eastern capitalists has been making arrangements to build a large irrigating and mining ditch to take water from the Rogue river near the forks and carry it along the foothills to Gold Hill and the Kane creek country. The proposed capacity is 10,000 inches.

THE report of the State Comptroller of Nevada shows that there were 90,799 tons and 1397 pounds of ore worked in the State for the year 1896, giving a gross yield of $3,857,841.38. Of this amount Lincoln county turned in 41,183 tons and 1836 pounds of ore, giving a gross yield of $1,528,283.63. The balance of the counties turned in 49,616 tons, giving a gross yield of $2,329,557.75.

DIRECTOR PRESTON of the United States Mint has issued a statement showing that there is on hand at the several United States mints, purchased under the act of July 14, 1890, 119,827,991 fine ounces of silver bullion, which cost $108,208,996, and the coinage value of which is $154,929,120. Five and three-quarter million ounces are at San Francisco, three millions at New Orleans, half a million at Carson City and the balance at Philadelphia.

THE fact that 1000 tons of delayed freight await shipment to different mines from Oakdale, Stanislaus Co., Cal., illustrates the need of road improvements. At present throughout a large area of California the roads are impassable for a vehicle of any kind. The attendant loss in one season, represented in dollars, would go far toward putting those foothill roads in better shape. Lack of proper road facilities is one of the most serious drawbacks to the prosperity of California's mining industry.

THE New York correspondent of the London *Mining Journal* states that any London firm desiring a copy of the report of the California State Mineralogist will be able to procure one by simply writing to J. J. Crawford, State Mineralogist, San Francisco. This impression prevails in other parts of the country. Any one in California may obtain a copy by personally applying at the Bureau, or by writing and forwarding 17 cents for postage. But those outside of California must forward $1 in order to obtain it.

THE digging of big tunnels in Colorado to tap the big mining districts has become an important industry and is doing much toward developing new mines or improving old ones. But there is arising considerable trouble as to the ownership of blind leads cut. The tunnel people claim the right to all blind leads along the line of their bore that were not discovered prior to starting their tunnel. This is hardly fair, and trouble is arising with owners of mines who have discovered and worked such leads that have been found after the tunnels have been started, but before they had cut them.

THERE is considerable discussion in Los Angeles, Cal., over propositions to regulate the production of oil so as to abate certain nuisances connected with it. One paper demands that the boring of oil wells should be prohibited within 1600 feet of a residence without the written consent of the owner. As there is no point within the limits of Los Angeles that is more than 1600 feet from a residence, this would amount to prohibition. The chief nuisance complained of is the running of overflows into the gutters. This, it is claimed, could be abated by forcing the owners of the wells to use more care.

EARLY in January a press dispatch announced the sale of the Caledonia mine at Cripple Creek, Colorado, in London for $585,000. It had been bonded by W. S. Stratton to the Six Brothers Company for $50,000. Some one in Colorado Springs wrote to a London paper showing that it was a case of overcapitalization with a vengeance. The result has been that English promoters have drawn in their horns and are putting it on their market at something nearer the real value. It might be a good idea for the English investors to look after their promoters a little more closely and quit putting the blame for their rascally swindles on the mine owners of this country, Australia and British Columbia.

THERE have been filed for record at Bakersfield, Cal., agreements of F. L. Mooers giving to Patrick Reddy of San Francisco option to purchase a one-fourth interest in the Olympus, Trilby, Rand, Singleton, Desert View and Johannesburg mines, Rand district, for $45,000, and one-fourth interest in the Triangle, Wedge, Yellow Aster and Mariposa mines for $5000, and agreements of E. Rose, John Singleton and C. A. Burcham giving Reddy an option on one-half interest in the Trilby, Olympus, Triangle, Wedge, Yellow Aster, Rand, Mariposa, Desert View, Johannesburg and Singleton mines, in the Rand district, at $100,000. Burcham, Mooers and Singleton were the first discoverers of the quartz mines in the Rand district. Shortly after the discovery a bond was given for their sale to Douglas Browne, a Colorado mining engineer, and his associates, and out of this grew a lawsuit, in which Reddy obtained as a fee a quarter interest in the properties. He won the suit and now it is proposed to interest capital to develop the mines.

RESIDENTS of Deadwood, South Dakota, have sent a telegram to the President protesting against the forest reservation lately made in the Black Hills, and saying that he has been deceived by persons without knowledge of the conditions or reckless of the consequences. This reserve, if maintained, they say, will affect disastrously all the mining and dependent industries of the region and largely compel its depopulation. Last Saturday Congress rescinded the presidential order so far as all the States, except California, were concerned. The entire area reserved was 21,379,840 acres. The two in California are the Stanislaus reserve, embracing 691,200 acres, and the San Jacinto reserve, an estimated area of 737,280 acres.

IN Victoria, Australia, a powerful local syndicate in the Bendigo gold fields has been buying up as many of the tailings heaps as they can secure. Among others they have purchased the tailings at St. Mungo, New Moon, Johnson's Reef, Beehive Crushing Works, and the pyrites works at Jackass Flat, all at Bendigo, amounting in all to over 2,000,000 tons. These will take fully five years to treat, and will prove of great advantage to the field by the adding of a good asset to mining companies, and the providing of employment. The same syndicate is also endeavoring to obtain a lease of the bed of the creeks in the district, and it is estimated that if they are successful in getting the right to wash them they will have fully 3,000,000 more tons to operate upon.

A TELEGRAM from Washington announces that W. J. Puckett, assayer in charge of the Denver mint, has made a report to the director of the mint at Washington on the value of the mine production of Colorado for 1896. His figures are: Gold, $15,110,960; silver (coinage value), $27,859,042; lead, $2,784,065; copper, $811,782; total, $46,565,849. Mr. Puckett's estimate of the gold production for 1895 was $15,013,434, and the director's report for that year makes the production $13,305,100. The silver production for 1896, it is stated, has fallen off about $3,217,000. Two disasters, Mr. Puckett says, materially reduced the mineral production of the State during the year—the Cripple Creek fire and the Leadville strike.

THERE is considerable adverse criticism in Washington of President Cleveland's action in withdrawing from sale as forest reservation 8,056,087 acres in that State, or nearly one-fifth its total area. It is claimed that these lands include most of the best mineral land in Okanogan county, and, while the act does not prohibit miners and prospectors from entering and searching for mineral, it does, it is claimed, prevent the development of the properties, as the timber cannot be used. It would appear that there should be little trouble in getting a further proclamation from the President or an act passed by Congress giving the right to use timber, under proper restrictions. If so, it will be much better for the mining industry after a few years that reasonable restrictions are put on now.

A BILL has been introduced in the Legislature of New Mexico providing that all mining claims shall be thrown open to relocation after a period of ninety days, provided that the first locator has not done the required assessment work—a 10-foot hole or its equivalent in an adit or other work. The bill affects only that class of persons who have by their non-compliance with the law in not doing any work whatever, forfeited their claims, but are still holding public domain by a series of relocations to the exclusion of bona fide locators and prospectors, thus retarding the mineral development of the mineral resources of the Territory. Under the bill a man may locate as many claims as he pleases, but will forfeit any upon which he does not do the required work within ninety days.

A BILL introduced in the British Columbia Legislature as a government measure as to corporations provides that no company hereafter shall commence business unless 10 per cent of its capital stock shall be paid up in cash. Another important clause is to the effect that nothing done by a foreign company, although valid in the country where it was formed, or permissible under its original corporate powers, shall be of any force unless it be within the rights, powers and privileges and according to manner exercisable by companies under the proposed act. Another provision is that every foreign company shall have a registered office in British Columbia. Al companies will be compelled to prepare a balance sheet once a year showing receipts and expenditures. The new rate for charges for registering companies will be one-tenth of 1 per cent on capitalization.

IN Cuba, while gold and silver have not been found in paying quantities, copper was mined at Cabre by the natives before Columbus discovered the island. Early in this century English capitalists purchased mines near Santiago, and the books of the Consulate show that from 1828 to 1840 an average of from two to three million dollars' worth of copper was shipped annually to the United States from these mines They continued in successful operation until 1867, when a combination of circumstances, and not the poverty of the mines, closed them up, and the various shafts, from 900 to 1200 feet deep, filled with water, all save 300 feet being below the level of the sea. In later years, considerable copper was taken from these mines by pumping the water from shafts to tanks into which iron scraps were thrown.

ON the first of this month the De Lamar mine in Lincoln county, the most productive mine in the State of Nevada was closed down. In connection with this Captain De Lamar, the principal owner says: "The recent organization of a miners' union under the direction of Edwin Boyce, president of the Western Federation of Miners, and movements on the part of a certain element which appears to have arrayed itself against the company's interests, all indicate that the brewing of a strike has begun, and induced us to take this step. The property will be closed down for an indefinite period. We desire to give those who have inaugurated the movement and those whose co-operation they are soliciting plenty of time for reflection. The lesson which has been recently taught through the trouble at Leadville should serve as a warning to those who are agitating the movement at De Lamar, and I make the prediction now that every man who participates in it will live to lament his action. At Leadville the place of the union miner has been taken by the miner from Missouri, homes have been broken up, men to whom they were dear have been compelled to seek employment in strange diggings—some perhaps, in Missouri, where the wages are $1.25 a day as against $2.25 in Leadville. At the De Lamar we are paying $3, and those who receive it are prosperous."

Turquoise Mining in New Mexico.*

Written for the MINING AND SCIENTIFIC PRESS by W. C. FENDERSON, Santa Fe, N. M.

The early mining of turquoise in New Mexico is enveloped in a haze of myth, tradition and superstition difficult to penetrate. The searcher for authentic history concerning this fascinating subject is confronted on the very threshold of his endeavors with fact and fiction so skillfully interwoven by the hand of Time and so generously amplified by myths long antedating the discovery of America that he is apt to view the segregation as a well-nigh hopeless task.

One of the oldest gems known to history, it would seem that the turquoise wherever found has always formed the basis of the most fantastic superstitions. This is easily accounted for. The stone is extremely sensitive, and under slightly varying temperature as well as by contact with certain solids and fluids changes color. Thus it has come to be consulted as an omen, and endowed with magic and talismanic properties—virtues which it has retained to a great extent up to the present day. Of course, many of the grosser superstitions connected with turquoise have disappeared and are now to be found only in time-stained volumes of the fifteenth, sixteenth and seventeenth centuries. Others have survived time and the spread of intelligence and are as potent to-day as in the past.

Persian soldiers prize this stone as a protection against contagion, as do the Indians of New Mexico, and Russian officers carry it for its supposed efficacy against the fatal effect of wounds received in battle. The monarchs of the East wear turquoise amulets, and also use it in decorating horse trappings, swords, etc., and everywhere throughout Eastern countries it is believed to protect the wearer against disease and insure him a speedy triumph over his enemies in war. In affairs of the heart, too, it was and is held as a charm of great potency, and in this regard the Indians of New Mexico hold an opinion exactly similar to that entertained by their more enlightened brothers of the East.

The stone they say is composed of elements having the closest affinity with the wearer. As long as love lies in the heart of the person receiving the gift, so long the stone retains its brilliant color. But with the decline of affection the animal life of the stone experiences a corresponding decline and finally dies with the love of the wearer. Hence the change of color. This is held as a safeguard against any possible deception on the part of the lady. When the stone begins to lose its azure blue and take on a green tint the fond lover need not ask his queen if her love is growing cold. He simply consults the gift stone, which is a true register of her feelings.

On the same principle the turquoise, according to the belief of many, changes color with the decline of the wearer's health. About the middle of the sixteenth century a Spanish lapidary named DeVargas wrote a learned treatise on precious stones, from which I extract the following: "One of my relations had a turquoise which he had set in a ring of gold and wore on his finger as a superior ornament. It chanced that he was seized with a malady and gave up his life. During the whole time in which he enjoyed his full health the stone was distinguished for its beauty and clearness, but no sooner was he taken ill than it commenced to fade and upon his death it assumed a withered, lifeless green color as though mourning for its master." * * *

Coming down to our own times, certain facts are known to observers and experts concerning this stone upon which were no doubt constructed the myths and superstitions of credulity. Lapidaries are well aware that the brilliancy of turquoise depends to a great extent upon the weather, also that certain persons cannot wear the stone without causing it to deteriorate, in many cases never to be restored to its original brilliancy. Only a short time since a New York physician told me that he had seen a valuable turquoise ring entirely ruined on the finger of a man who had been stricken with a severe attack of typhoid fever.

Turquoise is found in Persia, Saxony and New Mexico. The Saxony product is of an inferior grade, is found in red sandstone and is so sensitive that most of it is ruined on the lapidary's wheel. Practically all of the turquoise of the world has been taken from the mines of Persia and New Mexico. The Persians call it *firusa*, and this is probably the *callais* of Pliny. The Persian stone has a chemical composition represented by the formula $2al_2O_2P_2O_5H_2O$, and the Shah has for years controlled the output of his country, allowing only gems of an inferior quality to leave his collection, supposed to be the most valuable in the world. According to report these mines are about exhausted, and it may be due to this fact that the industry in New Mexico is receiving so much attention of late. But from whatever cause, the fact remains that the production of turquoise bids fair to become one of the leading industries of the Territory. The Mexican name for this stone is *Chalchuitl*, and how long the mines of New Mexico were operated prior to the Spanish conquest is a mere matter of speculation. That the work was extensively carried on in a dozen different locations is attested by the implements unearthed in recent years which were used by the Indians before the advantage of steel or iron tools was known to them. Near Cerillos, in the southern part of Santa Fe county, there is a section of mountainous country over two hundred acres in extent, every foot of which has been worked over in search of turquoise. Here it was that the big *Chalchuitl* mine caved upon its workmen and buried alive half a hundred natives who were worked in slavery by Spanish masters. It was this incident that caused the revolution of 1681, when the Spanish were driven out of the Territory and forced to remain away for a period of sixteen years. Striving to obliterate all memory of their hateful slavery, the natives filled up every mine in the Territory, destroyed churches and even whole towns in their endeavors to wipe out the work of their oppressors. This was the largest turquoise mine in New Mexico in the old days, and so it is at the present time.

*See engravings on front page.

The Indian method was crude in the extreme. Their only implement was a stone hammer, and they never got deep enough to find the best stones. The white man of to-day follows the lead of his Indian predecessor in these old mines, but goes about 10 feet deeper, there finding his purest gems. The Indians had a curious method of blasting turquoise rock. Over the refractory mass they would build a hot fire and then dash upon it water, causing the rock to crack. Then the stone hammers came into play and the ore was crushed into beads, which after being drilled were strung and worn as ornaments or charms.

Out of some sixty or seventy turquoise claims in New Mexico, about a dozen mines are in operation. The total output of turquoise in the Territory was $150,000 in 1891, $175,000 in 1892, $200,000 in 1893, $250,000 in 1894, $350,000 in 1895 and $475,000 in 1896.

These figures are taken from official sources, but no doubt greatly underestimate the true value of turquoise mined since 1890. Why this is so will appear from the following incident: Last year the owners of the largest turquoise mine in the Territory put in a valuation of their property amounting to $250. The County Commissioners, knowing that the mine had been in constant operation, considered the valuation absurdly low and set about an investigation which resulted in raising the valuation from $250 to $25,000, upon which the owners cheerfully paid the levy. This same mine sold in 1893 for $250,000, and, according to the statement of a former owner, has paid a million and a half a year since that time. In 1895 one stone was taken out that sold for $6000. This stone is now owned by a New York jewelry house that also controls four of the best mines in the Territory.

Recent discoveries have been made, demonstrating the existence of valuable turquoise deposits, notably in the Burro mountains near Silver City, about the Hachitas, and in the Jarillas as far south as Las Cruces. As before stated, the oldest and best known mines are located in the southern part of Santa Fe county, near the town of Cerillos. Most of the claims being worked in this section are the old filled-up mines of slavery days, though several have been opened of late on virgin ground. The greatest secrecy is maintained, both as to the location of mines and the method of working them. No one is allowed to inspect a turquoise mine, and employes are warned against giving any information concerning operation upon pain of immediate discharge. Some time since Gov. Thornton, who is very fond of turquoise, asked permission to inspect one of the mines at Cerillos. He was refused. The formation in which turquoise is found varies greatly. In the vicinity of Santa Fe the matrix is usually a white trachyte stone filled with bright crystals of pyrites, which upon decomposition from exposure turns a rusty brown. In some cases the matrix is red sandstone. In the Burro mountains the formation is rose quartz, slender needles of which penetrate the turquoise deposit, spoiling it for gem purposes. In the Hachitas the matrix is a red granite. It is difficult to account for these vagaries in formation, existing in the case of no other mineral known to science. The turquoise solution in the form of a liquid was undoubtedly at some period infiltrated into the seams of the rock, where it gradually solidified. This is proven by the fact that wherever the veins are wide enough the turquoise is found in uniform pebbles with a talcose surrounding.

The color of the gem varies as much as the formation, azure blue being the color most sought and most likely to hold its color. The dark blue stones are preferred in England, pale blue in the United States commands the best price, while in Paris pale pea green or apple green stones are the most sought.

In Russian Persia and the East Indies there is not much choice in the matter of color. The prices of these gems—that is, clear stones without a flaw—are nearly uniform the world over. For small stones, from 50 cents to $2 each. Good ring stones find ready sale from $25 to $200 each. Large stones of good quality and color realize exorbitant prices. A perfect stone about the size of a silver quarter would bring $3000, either in European or American markets.

Chemically, the American turquoise has about the same properties as the Persian product, the former being composed of: Alumina, 47.75; phosphoric acid, 27.34; water, 18.18; protoxide of copper, 2.02; peroxide of iron, 1.10; peroxide of manganese, 0.50; calcium phosphate, 3.41.

The great profit in turquoise mining is found in the simple and inexpensive methods of handling the ore. No costly machinery, no intricate and expensive treatment of the product of these mines are required. From surface indications a shaft is sunk, until turquoise rock shows up in paying quantities. Then drifting commences—that is, tunnels are run to follow the vein. The rock is blasted and then broken into portable shape by sledge hammers, then put into a bucket and hoisted to the surface by means of a windlass. Here it is sorted, then packed into boxes and shipped to firms that have contracts with the mine owners for cutting. Most of the New Mexican turquoise goes to New York, very little being cut in the Territory. The average Mexican turquoise miner gets $1.50 a day; Americans get $2.50. The larger mines work only seven to ten men each, and in good rock this force can take out from eight to ten thousand dollars daily. This was the record of one of the mines near Los Cerillos for a month and a half last year, then the pay streak petered out and there was three months of dead work. There is undoubtedly a great future for turquoise mining in New Mexico, but those now engaged in this industry knowing that they have a good thing, try to create the impression that the mines now in operation are being conducted at a loss. This causes them to maintain the strictest secrecy in everything relating to the business. They will not allow photographs to be made, or consent to allow any one to inspect the mines; neither will they give any information concerning the subject in general. There are not half a dozen people in New Mexico who have ever seen turquoise mined, outside of those engaged in the work.

Copper Refining.

In his address before the chemical section of the British Association, Ludwig Mond, speaking of copper refining, said:

The first patents bearing on the electrolytic refining of copper were taken out by James Elkington of Birmingham in the years 1865 and 1869; and some time between these two dates the first electrolytic copper refinery was established at Pembrey, near Swansea. It is interesting to note that this works, though it has now passed into other hands, is still producing electrolytic copper; and though England to-day no longer stands in the forefront of the electrolytic copper industry, it is because the conditions of the industry have changed, and not because she has lacked either the money or the brains requisite to continue an industry which she originated. The famous Mansfeld Copper Company of Germany were the next to use the process; and in 1872 a small refinery was started at Eisleben, near the Hartz mountains. The "Norddeutsche Affinerie," at Hamburg, followed in 1876; and, two years later, the Oker Refinery of the "Communion Huttenwerke" was commenced. A large number of small refineries in France and Germany now sprung into existence; and for many years these European refineries, including three or four in England, had the production of electrolytic copper in their own hands. The "Norddeutsche" refinery at Hamburg, with two plants, was the largest and best arranged of all these; and of the others, that at Pembrey alone approached it in output. Yet the combined annual output of these two works in the early days of the industry was only 1000 tons. A rapid development, however, in the scale of operations occurred between 1880 and 1890. The spread of electric lighting, and the demand to which it led for a pure copper, caused new refineries to spring up and the older ones to increase their output enormously. In Europe the "Norddeutsche," Messrs. Vivian's and Messrs. Bolton's, with the original refinery at Pembrey, ranked first in size; but the development of the industry in the United States quite overshadowed these European extensions.

The mine owners in America who had been rapidly increasing the output of raw copper from the mines were struck by the very obvious fact that they were paying European refiners to do what they could equally well do themselves. With the energy and love of bigness characteristic of our friends across the Atlantic, they set to work and planned refineries on a scale that has reduced some of the early European ones to mere toy dimensions. Some of these refineries have been doubling and trebling their output of electrolytic copper in the years 1892–1895, so that to-day not only the output of raw copper, but also the amount refined, is greater in the States than in any other part of the world.

At the end of the year 1895 one-third of all the raw copper produced in the States was being refined there, and it was expected that this year the pro-

portion will have risen to half. Adding the amount refined electrolytically in Europe, it is safe to estimate that at least 100,000 tons of raw copper are now being treated by the electrolytic refining method. We thus arrive at the remarkable fact that an industry started on a small scale by Mr. James Elkington at Pembrey about 1868, and one which, until about 1885, did not show any remarkable signs of development, has become nearly as important as the copper industry itself, and has extended until it embraces over a quarter of the entire copper output of the world.

This rapid extension has been chiefly due to the demand for a pure copper for electric construction purposes; but the recovery of the whole of the silver and gold contained in the raw copper, at a comparatively small cost, has been a very slow process.

Outline of the Geology of California with Reference to Its Mineral Deposits.

NUMBER IV.

Written for the MINING AND SCIENTIFIC PRESS by HAROLD W. FAIRBANKS Ph. D

Gold deposits occur in all the pre-Cretaceous rocks of California. Their character differs, however, somewhat with the kind of rock and the ease and regularity with which it fissures. The reasons for the mineralogical differences are not well understood. The veins in the granite in eastern California have generally a rather base character below the water line, while in the main gold belt on the western slope, where there is little granite, a large part of the gold occurs in the free state. It is all nonsense to assert that gold is found with any particular class of wall rocks. The importance of the mineralogical character of wall rocks has been greatly overestimated. In my experience over nearly the whole of California I cannot recall any rocks with which gold is not at times associated, unless it is some of the modern volcanic rocks, and while along the mother lode it may be more often found with slate and greenstone, yet in other parts it occurs in the most diverse kinds of rocks. We may say, then, that in the distinctly mineral regions of California the deposition of gold at least is but slightly influenced by the character of the inclosing rock. The fact ought to be emphasized that no rules can be laid down for the guidance of prospectors in regard to the kind of wall rock they ought to look for. In a region of dikes the gold is not due primarily to the presence of the dikes, nor to the good fissures which may be formed along their contacts—fissures, of course, formed more easily and regularly than in the non-laminated rocks—but rather to subterranean heat, movements fracturing the rocks, and mineral-bearing waters. Dikes are indications of mineral veins only in so far as they offer lines of weakness and fracture for the passage of solutions in a mineralized region.

We ought not to conceive of the gold-bearing veins as in general having been formed in large open fissures, for there is not much evidence of it in this State at least. Hot mineral-bearing waters remove gradually portions of the walls of fissures, acting most easily upon the partly ground-up material, and then upon the solid rock itself. It is known that the veins of the gold belt were formed at a very great depth, and it is inconceivable that openings the size of the great ore bodies which have been found should have existed during the long period requisite for their filling. The banded or ribbon quartz of the mother lode region is due, it seems to me, to repeated loosening of the walls of the fissures as a result of mountain disturbances, so that thin layers of quartz are separated by films of chloritic matter derived from the rubbing of the wall upon the quartz when the fissures were tightened.

As has been said before, the gold veins were formed ages ago (close of the Jurassic), and since then the surface of the country has been profoundly modified. As a result, the topography to-day gives almost no idea of what it was when the veins were formed, so that paying veins are just as apt to be found in a stretch of rolling country as one highly mountainous. If a prospector is satisfied by the general indications that he is in a mineral region, he may, until he learns its characteristics, as well prospect in one portion as another, guiding himself by placer deposits, float rock and the reddened character of the outcrops. As far as the present topography is concerned, one is as liable to find permanent paying veins in the granite knobs and gently rolling hills of some portions of the Mojave desert, as in the very high mountains farther north in Inyo county. The events which gave rise to the mineralization of this region are separated by ages from those which originated the recent topography. The most of the mineral deposits of eastern California bear no relation to dikes. The gold and silver both occur in association with a great variety of rocks and very frequently in the massive granite. Why it is that the great granite areas of the Coast ranges are free from minerals it is difficult to say, unless it is that the conditions which gave rise to the mineral springs of the gold period were absent from this region. The deposits which are occasionally met are probably of the same age as those in the Sierras and Klamath mountains.

During the deposition of the gold and silver, and for many hundreds of thousands of years afterward, the mountains of California were undergoing erosion and their material being carried off in the streams. We have no adequate means of discovering how many thousands of feet in thickness of rock has been disintegrated and removed.

Silver seems to be chiefly confined to the region of the great basin east of the crest of the Sierra Nevadas, where it either occurs by itself, generally in limestone, or with gold in other formations. The occurrence of the precious metals seems to be somewhat different geologically in that region from what it is in the rest of the State. The gold is characterized by the fact that it occurs almost wholly in iron or copper pyrites below the water line. Why silver is abundant in that region and not farther west we do not know. It may be dependent partly on the different conditions of deposition, for it is mainly found in limestone, which is abundant there, and partly upon the original difference of the chemical action in the deep seated regions from whence the mineral bearing solutions derived their contents. The evidence is good that the silver deposits when they occur in chamber form in limestone are due to replacement, but whether they occur at as great depths as gold we have not yet sufficient evidence to say. At Modoc, in Inyo county, the best ore is reported at a depth of over 1000 feet.

The Sierra Nevada region has never been covered by the sea since the great upheaval previous to the period of mineralization, but the Coast ranges have been almost submerged many times. The mineral deposition ceased before they first began to sink for the next younger rocks, the Cretaceous, contain none worth mentioning. These younger rocks are generally so different that it is not often the prospector can make a mistake, although he may in some portions of the Coast ranges.

Through the long geological ages represented by the Cretaceous, Eocene, Miocene, and a part of the Pliocene, the Sierra Nevadas were undergoing erosion and being reduced from a lofty range to one with gentle slopes and broad river valleys. Oscillations of level took place, but they were not so pronounced as in the Coast ranges, where the land rose and sank many times in response to an equilibrating movement of the crust. In these ranges these disturbances are used to mark off different divisions of geological time. The northern end of the Sierras, now occupied by Lassen's Peak (volcanic ridge), was below water. An arm of the sea extended up the Sacramento valley and into Oregon, making an island of the Klamath mountains. During a part of the period of depression, known as the Upper Cretaceous, the streams flowing from the Klamath mountains brought down to this old seashore considerable quantities of gold, and the waves and currents distributed it along the ancient beach, together with gravel and boulders, to form the conglomerates now exposed in this region. They appear in Shasta and Siskiyou counties and in southern Oregon. These auriferous deposits have been erroneously considered as an ancient river channel, but they contain ocean shells and must have been formed along the shore.

In the northern Sierras, during the Eocene and Miocene, the climate was warm and moist, as shown by the vegetable remains in the old lakes and river beds.

During hundreds of thousands and perhaps millions of years the rivers of the Sierra Nevada region were concentrating the gold from the disintegrated quartz veins as the wear of the rocks exposed them to view. It is quite certain that in the gravel now deeply buried along the eastern side of the San Joaquin and Sacramento valleys lies untold wealth which can probably never be reached. The ancient streams which finally became almost choked up by means of the sand, gravel and boulders gathered in their beds, we now recognize as the auriferous gravel channels. They flowed much the same direction as do the modern streams, but in broad shallow valleys. The scenery of the Sierras was then tame and uninteresting, and the climate warm. The sea filled the Sacramento and San Joaquin valleys, and the Coast ranges were low and bordered with islands. These ancient river channels are to be observed occasionally in the southern part of the State and on the peninsula of Lower California. In San Diego county is one rich in gold, also in the San Gabriel and San Emedio mountains. The placer deposits about Goler, in the Mojave desert, are partly modified shore deposits and partly the result of stream erosion. The topography of that region is an ancient one, and the amount of gold buried at considerable depths in the desert gravels must be very great.

During the Pliocene disturbances began to be experienced along the crest of the Sierras, and enormous volumes of andesitic lavas were poured out. Some of the flows built up low portions of the crest, while others flowed down the ancient river beds toward the west. Mud and boulders accompanied these flows, capping the old river beds. Following the lava eruptions, a renewed activity in mineral deposition took place east of the Sierras and in portions of Nevada. The silver deposits of Alpine county, the enormously rich gold veins of Bodie and the Comstock lode date from this time.

Some time after the lava flows were inaugurated the Sierra Nevadas began to rise through the formation of faults or fissures on their eastern side, giving rise to the precipitous scarp extending for over 100 miles. As the land arose the streams commenced to cut out their beds and made the beginning of the deep canyons in which they now flow. The sea was finally crowded out of the great valley of California, and the Coast ranges were elevated to approximately their present proportions.

We have so far only slightly touched upon the history of the Coast ranges, which is complex but very interesting. The geological history of no portion of California has been more misunderstood than this region. An old theory of the geologists was that the continent has grown successively westward by the addition of range after range of mountains elevated from beneath the sea, and that as a consequence the last bordering the ocean must be the youngest.

(To be Continued.)

Recent Additions to State Mining Bureau Exhibits.

Trilobites and other silurian fossils from the Chicago drainage canal.

Silver-bismuth ore, Yankee Girl mine, San Juan, Colorado. F. C. Mathyas.

Gold quartz with free gold, Harrison gulch, Shasta county, Cal. H. B. Gaston.

Gold quartz, Fortuna mine, Arizona. C. D. Lane.

Gold quartz, several specimens, Kalgoorlie, West Australia. A. G. Holroyd.

Telluride of gold in calcite, Kalgoorlie, West Australia. A. G. Holroyd.

Gold quartz, Rand mine, Randsburg, Kern county, Cal. W. H. Wilton.

Gold quartz, several specimens, Berner's bay, Alaska. L. G. Bach.

Gold and silver ores, several specimens, from Colville Indian reservation, Washington, and Rossland, Slocan, etc., B. C. L. E. Richardson.

Auriferous vein matter—ochrous earth assaying $7500 per ton, Blue Bell mine, Hayden Hill, Lassen county, Cal. Ed B. Preston.

Gold quartz showing free gold, Cadmus mine, Nevada City, Cal. Chas. Kahl, Supt.

Ten specimens new minerals—bravasite, bieberite, caxoclasite, berzelite, cryophyllite, ralstonite, riebeckite, bayldonite, leuchtenbergite and diaspore. J. Z. Davis.

Gold quartz with copper, etc., Mesquite mountain, near Garlock, Kern county, Cal. F. Adams.

Gold quartz assaying $78 per ton, Syndicate mine, Potter Ridge, Madera county, Cal. Jno. S Wilbur.

Polished specimens of aragonite from Utah. F. C. Mathyas.

Auriferous pyrite, Congress mine, Arizona. W. H. Storms.

Gold quartz, Aravaca district, Arizona. J. Danker.

Gold quartz, Philadelphia mine, El Dorado county, Cal. J. B. Polk.

Polished specimens marble and serpentine—California. A. L. Seager.

And a number of other specimens from various localities.

Feb. 26, 1897. H. S. DURDEN, Curator.

Mines in Sweden.

Some forty years ago numerous finds of iron, copper, nickel and silver ore were made round the lakes Ann, Kall, Jufoern and Anjau, and some of these finds were worked during a short period. At that time the railroad from Drontheim to Ostersund did not yet exist, and the ore had to be carted from the mines to the Norwegian coast, or to the Roros metal works in Norway, a distance of over 150 miles in some cases. The expenses of such a long carting and the impossibility of transporting large quantities of ore, proved mining to be unprofitable and the mines were soon closed up.

The public have taken little or no interest regarding these mines since that time. However, it seems now as if the improved communications, the railway from Drontheim to Ostersund, the steamers that are trading on the lakes in summer time, the projected new Government railroads, and the invention recently made by the Swedish inventor, Dr. G. De Laval, should rouse the interest that was exhibited during earlier days.

Dr. De Laval has constructed a furnace, by means of which, and through the application of strong electric steam, it would be possible to smelt the ore, and to extract the metal with great facility and economy. A company has been floated with a capital of more than a million pounds, with the object of utilizing this invention, and the company has acquired the immense waterfalls near Trollhattan, and is trying to buy several other falls in the neighborhood for the same purpose.—London Mining Journal.

Mining Summary.

CALIFORNIA.

Amador.

Republican: The Murphy claim, in Hunt's gulch, was bonded some time ago by William Doyle, owner of the Doyle mine. Doyle, in turn, has bonded the claim to O L. Golinsky of San Joaquin. Work has already commenced upon the property. It is the intention to sink a shaft and prospect the mine to some depth.

Record: At the South Spring Hill, mine Superintendent J. R. Tregloan is preparing to sink 500 feet deeper, and machinery for that purpose has been purchased. On the east vein in the Median shaft a contract has been let to sink 100 feet. The machinery at this shaft is being overhauled and safety brakes are being put in. A portion of the stamps in the mill are running on ore from the Talisman shaft. A sudden influx of water in the South Spring Hill mine recently has delayed work somewhat in that quarter. However, the big storms caused the same trouble all along the lode.

Dispatch: At the Kennedy they are sinking the south shaft from the 1950-foot level, and will probably go down to the 2200-foot level before stopping. They are working the levels from the 2100-foot level in the north shaft, taking out ore enough to keep the 40-stamp mill running night and day.

The mill has been started up at the Amador Queen No. 2.

Superintendent Ross is getting the upper hand of the water in the Mahoney mine, and operations will be resumed in a few days.

The new and larger hoist at the Amador Queen No. 1 will be ready for use in a short time.

Ledger: At the Alma the ledge has been prospected from the 1000-foot level with a diamond drill and was found to be about 100 feet from the shaft. It prospected from $6 to $36. A station is now being cut and crosscutting commenced. They expect to encounter the ledge in about four weeks.

At the Bellwether in January employes were notified that at the end of the current month they would have to take 100 shares of stock at 25 cents per share. On pay day the stock was issued to them. A few days later all except one shift were laid off, and advertisements appeared offering Bellwether stock for sale at 10 cents per share. Some of the men are threatening to compel the managers of the company to refund the money and take their stock back.

Butte.

Register: Jas. Carlisle will start his mill soon, and it is thought the new road up from Enterprise will be pushed ahead this spring.

It is reported that E. W. Slater will erect a 5-stamp mill on his quartz ledge in the spring.

Calaveras.

At the Gwin work is being prosecuted on the 1200, 1300 and 1400 levels, and the forty stamps are kept busy. It is expected that when the mine has been properly opened up twice that number of stamps will be kept busy.

The Ford mine is almost the first effort at deep mining around San Andreas. The mine was operated for some time by the Ford brothers, but later corporation was effected, a number of the leading citizens of San Andreas and their friends taking a portion of the stock, and they have kept a force of men employed under the Ford brothers. The shaft is now down 400 feet. The company intends to continue the shaft on to the 1000-foot mark. A mill test of about 1000 tons is to be made as soon as a mill can be secured for the purpose in the neighborhood.

El Dorado.

(Special Correspondence).—Work will be resumed this week on the W. W. Stone quartz property south of town, both on the shaft and tunnel, that were abandoned some time ago. The ledge is from 3 to 5 feet and the ore of fair grade.

Preparations are still in progress toward establishing an electric power plant on the American river. New York people are now at the head of the enterprise, and they are making haste slowly.

A 10-stamp mill is in course of construction on the Hoge property, seven miles west of Placerville.

An option has been given on the Tunnel and Shaft mine, one-half mile north of town, to San Francisco people.

Sinking and crosscutting is progressing rapidly on the Steub property, near Diamond Springs. This was formerly known as the Griffith Consolidated, and, though a good producer many years ago, was abandoned at 150 feet depth.

The Lookout mine and 4-stamp mill are producing good results. The ore body is large. The property is twelve miles southwest of Placerville.

At the Blachard mine, four miles south of town, sinking and drifting are being persistently pursued, and the 5-stamp mill is in constant operation.

An English company is examining a large property in this vicinity with a view to purchasing. There is considerable development work done, and the experts are pleased with the results of their assays. The result of the negotiations will be definitely known in about sixty days.

Benson, Burns, Carmichael and Kell are running a tunnel and taking out rich ore in the Poverty Point section within a mile north of town.

Placerville, March 2d, '97.

Nevada.

Transcript: Mr. Epstein, one of the original owners of the Pittsburg mine, has purchased C. J. Bandman's interest and is now the principal stockholder. It is his intention to pay off all claims against the company and resume operations on quite an extensive scale. Work will begin in a short time, and a large force of men will be employed. Years ago the Pittsburg was considered one of the best mines in this district. There is a good mill and hoisting plant on the mine, and about 100 tons of ore on the dump.

Placer.

Sentinel: The last contract of 100 feet in the Gold Run tunnel was let last week. This distance will tap the 49th and 54th shafts, which is known to be rich milling ground.

At the Glen Consolidated gravel mine at Duncan canyon, on the Forest Hill divide, they have developed a well-defined channel. The gravel is coarse and heavy and runs from $3 to $10 a car, making an average of over $5. The company owns 550 acres, covering 12,000 feet of the channel. They have a breast about 80 feet wide, but the channel is over 100 feet wide. The gravel is blue and is soft and free. Very little powder is used.

At the Polifka the ledge is about 8 feet wide. It will be opened on a larger scale in the spring.

The Hidden Treasure Company have everything in shape now at Centerville for extensive operations. A larger force has been put to work. They are preparing to place an electric-power plant early next spring in the east branch of El Dorado canyon, near the mouth of the Hidden Treasure tunnel. They will convey 40 inches of water which flows from the tunnel to a point above the site selected for the works. The survey shows that 864 feet of pressure can be obtained. This will give them 75 H. P. The current will be transmitted to the Dam claim, a distance of three miles, and will be used to illuminate the mine and to furnish power for operating the blower, the forges and running the cars.

At the Red Point gravel mine the main working tunnel is now in nearly 10,000 feet. The gravel is yielding well and sixty men are employed.

Plumas.

Oroville *Register*: A telegram has been received from Supt. Wingate directing the Thistle Shaft mine to begin operations on the first of April and to pump out the water regardless of the expense. It is said if the Thistle Shaft mine cannot be successfully drained by pumping a mile tunnel will be run which will cost about $60,000.

No work to amount to anything is being done on the Gold Bar and other mines on the Middle Fork, but work will be pushed as soon as spring opens.

Work is being driven energetically at the Bunker Hill and North America mines under Supt. Meikle.

At Saw Pit there will be more mining done this year than for many years past and much of the work will be hydraulic mining.

Mr. Turner near Onion Valley has a good quartz ledge and has a strong company to back him in building a mill and working the mine.

Wingate & Alsby have struck a good ledge in the Slate Creek district and it is reported that a mill will be erected in the spring.

E. Squires will add a force of men as soon as spring opens at his mine near Gibsonville.

Independent: Charles Hegard of the Last Chance mine has completed the air shaft for the ventilation of the tunnel, which will be driven ahead as rapidly as possible.

National-Bulletin: Taylor Diggings hydraulic mine will soon be operated again. Mr. Wilson, the superintendent, sent out word last week to his foreman, Thos. Fant, to get the mine in readiness for active work as soon as the water season opens. The mine is a big proposition. Last year a deep bed of hydraulic auriferous gravel was developed. During the spring it will probably employ twenty or twenty-five men.

San Bernardino.

Los Angeles *Times:* The mines of the San Bernardino range are being worked to advantage. At the Rose they are drifting on the 700-foot level, taking out good ore.

J. W. Smart is working a rich stringer in Cook's canyon, assaying $200 to the ton.

O. G. Leach of the Black Hawk mining district has made a deal disposing of the Opera mine to R. F. Harrison, manager of the Rose, and the Llewellyn Bros. of Los Angeles.

Mr. Cochrane and others of Los Angeles have taken hold of the old Driscoll mine in Dry Lake district, and are down 75 feet in good ore.

Ed Dolch of Victor is having ore taken out of his mine that assays well.

E. C. Chappell is taking out ore from an adjoining claim.

The Valley Gold Company will resume operations in the spring under the management of W. E. Pedley.

The Green Lead people have struck ore that goes from $15 to $20 per ton.

Shasta.

Searchlight: The Minnesota mine, which has been idle for some time, will no doubt be started up during the present season. The ledge is from 3 to 6 feet wide where shown up by development work. The greatest depth reached so far is 400 feet. A 10-stamp mill is located on the property.

Supt. Von Krusze of the Sybil mine started his mill last week and is now crushing from twelve to fourteen tons of ore per day. There is ore enough in sight to keep the mill running for three or four months.

Courier: The Texas Consolidated is developed to a depth of 900 feet and is worked through a series of tunnels. No. 5—the lowest working tunnel—is about 1600 feet long, and is 650 feet vertical depth in the end.

Free Press: Supt. Frank Brightman is making arrangements to explore the Gladstone property with a diamond drill.

Manager Hill of the Mountain Copper Company has withdrawn his force of men sent to the Balla Klallala camp for the purpose of doing preliminary work pending a sale of the Windy Camp group of mines to the company, and the report is current that the sale will not be made.

Jackson and Perkins have discovered an extensive ledge on Muletown mountain, near the Markwick and Jones claims. The ledge is said to be 50 feet wide and can be traced for more than a mile.

Clendenin and Salnave are developing the Reid mine on Star gulch. A short time since they struck a rich ledge of ore in one of the tunnels.

Sierra.

Enterprise: At the North Fork drift mine good prospects have been obtained from the gravel. There are twenty-three names on the pay-roll, and day and night shifts are employed.

Sixteen hands are employed at Lucky Dog Ravine drift diggings. The gravel averages $3 to $4 a carload.

The new north tunnel, being run for the northeast part of the Bald Mountain extension, up the ridge, is in about 400 feet, out of the 845 feet to be put through to where the streak was left long ago in No. 15 upraise.

Siskiyou.

News: About twenty men are employed at the American bar mine putting in the wing-dam and fitting up for work.

J. G. Waugh has been constructing a ditch to bring water from Buckhorn to his high channel mine on Beaver creek.

The Bonanza on Grizzly gulch will be opened up this spring, some very rich ore having been discovered last winter.

Clute, Winsell and Neal have leased the Thompson placer mine on Hungry creek, and are on the ground operating it.

S. J. Fore, superintendent of the Last Chance mine, will begin putting in place the big elevators immediately. Mr. Fore will soon begin the erection of a stamp mill on the quartz ledge that he bought from Davis brothers.

The Columbia mine has a force of men at work taking out quartz.

The gentlemen who have a bond on the Allen mine in Quartz valley are meeting with success. On the 350-foot level they drifted north and found a good 4-foot ledge that prospects well. Compressed air is used for drilling and also for running the hoist. The quartz is crushed in a 10-stamp mill.

Spengler Brothers & Co. are starting up their mine, known as the Humbug Flume and Mining Company's property, at the mouth of Humbug creek, embracing 100 acres of ground.

Journal: Hunter & Smith are sinking a shaft on the Greenhorn blue gravel mine, working day and night shifts, with their steam pump ready to drain the claim on striking water. They will probably have to go down 100 feet, to reach bedrock.

Chamberlain & Timmons expect to commence work again soon at the Mabel quartz mine, between Oak and Scott Bar, adjoining the Columbia quartz mine.

The miners on Empire, Lum Gray and Dutch creeks, in the Honolulu section, Klamath river, are all busy ground-sluicing with very good success. Several good claims have been worked at the head of Empire creek, some ten miles from the river, this being the first season that the creek has been worked above Junkers.

Reid and Green, have found rich prospects on the summit of the Humbug range, west of Yreka, in galena ore, most of the Humbug ledges containing considerable galena, carrying gold.

Thos. Cartwright, has relocated the old Eliza quartz mine on north fork of Humbug. This claim yielded well when first worked.

Tuolumne.

Mother Lode Magnet: At the Santa Ysabel the tunnel is in 200 feet on the grouge and the ledge is expected to come in at every shot.

At the Dutch machinery for the additional ten stamps which they are adding to the mill is arriving. A new engine is being placed in the mill, which will furnish power to run the stamps, and a blower for the mine.

At the Miller & Holmes mine the large ore chute recently discovered is being blocked out so that stoping can be rapidly done as soon as the mill is erected.

At the Norwegian near Robinson's Ferry some rich rock has been taken out and a two-stamp mill is to be erected as soon as possible. Twenty men are now employed at the mine, and the force will be increased.

Banner: The Rappahannock mine is to have a 15-stamp mill.

A new mill is to be erected upon the Norwegain mine near Tuttletown.

The hoisting works at the Mariatt, near Tuttletown, are completed and the clearing of the shaft of water has commenced.

Union-Democrat: At the Golden Rule on crosscutting at the 500 level two veins were cut 250 feet east, and drifting on them is continued night and day. One carries a width of 16 and the other of 8 feet, and both break easy.

The Accident mine at Big Oak Flat, owned by the James Bros., has been bonded for $8000.

The main shaft of the Jumper has attained a depth of 310 feet and still sinking. Most of the ore sent up comes from the 200 and 300 levels where drifting is under way, and the twenty stamps are kept busy crushing.

The Punchbowl gravel mine in Table Mountain, owned by Jamestown people, and which has lain idle for over a year, will soon be again put in full blast by a company of Paris, France. C. E. Shafer will be the manager.

The Heath syndicate will soon resume operations on the Clio and Heath mines. These twin locations were proven good before, having an 8-foot well-defined ledge which was reduced at the little 5-stamp plant belonging to the company.

Independent: Machinery is being put in the Modoc mine.

Active operations have been commenced at the Confidence mine, under superintendency of A. MacDonald. The 30-stamp mill has twenty of its stamps employed night and day.

The Louisiana mine at Cherokee has been sold and the money paid, the purchaser being the California Consols, Limited, a Scotch company.

OREGON.

Medford *Monitor-Miner*: The Gray Eagle mine on Sardine creek is showing up well, having a large ledge that will mill over $20 per ton in free gold.

The Jewett mine near Grants Pass is turning out much fine ore and the ledge is growing wider and richer as the depth increases.

Rogue River *Courier*: The quartz mine known as the S. S. on Jump-off-Joe has been bonded for sixty days to Portland parties.

At the Jewett mine the ore body is now from 7 to 8 feet in width and getting richer all the time.

Blalock Bros. have been piping night and day on their Grave creek placers running two giants.

Muir & Green, of the Junction mine on Louse creek are figuring on a big ditch to take water out of Evans creek and carry it to the mine. They have filed a water right below the forks of the creek some seventeen miles from where it empties into Rogue river and contracted for preliminary survey.

Another carload of ore is being loaded at Merlin by Taylor & Crow. The rock has to be packed on horses fourteen miles, but the net proceeds at Ashland always repay the owners well for the trouble.

E. N. Williams of Gold Hill sold his placer ground on Sardine creek to some Colorado parties, who talk of putting in a ditch from Rogue river to increase the water supply.

A large custom mill, one able to handle the ores of this section, would do much to advance the interest of this camp. There are large amounts of ore on the dumps that would pay handsome returns.

The Flagstaff is sinking at the rate of 5 feet per day and the management expects to strike water in a few days.

Deep sinking is going on at the Columbia mine in the Virtue district, but water is retarding progress of operations. A pumping plant will be necessary to meet the needs.

The shaft of the Fagstaff mine is at a depth of 500 feet, equal to 460 feet vertical. A vein of ore 3 feet wide between walls was struck at this depth a day or so ago. The machinery for the new 10-stamp mill has arrived.

Baker City *Democrat*: Captain Clough has transferred all his mining interests in the Sparta district to F. W. Tallmadge of New York and his associates who propose to operate in a large scale. The properties transferred are the Eagle canal and quartz and placer claims. The Sparta or Eagle canal is a ditch about thirty miles in length constructed in 1871 by I. B. Bowen, Sr., and E. P. Cranston, to supply water from Eagle creek for the rich placer mines at Sparta and old Gemtown, then one of the most productive gold districts in eastern Oregon.

GRANT COUNTY.

The Red Boy is working fifteen men. They have a 10-ton mill and are taking from $6000 to $8000 out per month. It is the intention to put in a 10-stamp mill in the spring. They are now driving a 1000-foot tunnel to tap their ledges at a greater depth, and, if they succeed in striking what they expect, will need ten or twenty stamps more.

Two four-horse loads of iron pipe and giant arrived last week for the Grant Gold Mining Company. The giant is the largest ever brought to this section of the country.

J. W. Larkin has five men at work on the Boston, on Buffalo hill. He has secured the co-operation of Washington and Idaho capital and it is intended to thoroughly develop the mine.

UNION COUNTY.

Republican: The most extensive operations carried on in Union are by the Union-Companion Mining Company. A deep tunnel so located as to prospect nearly all the ledges of the mountain and which, when extended to a point vertically under the summit, will give back or stoping ground of over 2500 feet above tunnel level. Already 1200 feet of this tunnel has been driven and a large ledge of good ore found on the Union-Companion vein at a depth of 400 feet below all their workings. The mine produces from $14,000 to $20,000 per month. Ore runs from $9 to $25 per ton.

The Red Jacket, adjacent to the Union-Companion is in litigation. Several thousand feet of tunnel work opened up large ore bodies from which many thousand tons have been milled.

Many other claims on the mountain have extracted and reduced ore at the ten small custom mills in the camp.

The Keady mines on East Egale have uncovered several ledges of from 1 to 6 feet in width and have profitably reduced the ore in a 10-stamp mill.

In the Sanger district the Bradley mine has been operated for several years, and has produced over a half million dollars in gold. Active operations ceased last season. A deep tunnel from Eagle creek is projected that will save steam hoist and steam milling, thereby reducing operations to a minimum.

Three miles northerly from the Sanger or Bradley mine is the Basin, a recent discovery, equipped with a new 5-stamp mill and operated to a depth of 200 feet.

WASHINGTON.

Spokesman-Review: The Skookum Mining Company have commenced to get their machinery and supplies forwarded to the company's placer grounds, known as the Russian bars, on the Pend d'Oreille river. They have a new device on the order of a steam derrick with a grapple, bucket-shaped, for handling the gravel.

The Rightsides mine, owned by W. J. Stambaugh of Kettle Falls, has been bonded by Mr. Wize and other parties of Rossland,

B. C., for $15,000, and men are at work developing the claim. The ore is rich in gold and copper.

At Loomis, in the Palmer mountain tunnel, work is steadily progressing with a full force of men, as fast as can be expected by hand drilling, but the company hope soon to have an air compressor plant in position.

The Similkameen Gold Placer Mining Company will, in a few days, commence operations on the claims on the Similkameen river with their dredger to raise the sand from the bottom by centrifugal pumps, and run it over tables coated with quicksilver.

Dr. Langhammer, who took a bond on the Allison group last fall, has made an agreement with a Chicago syndicate by which a 100-ton daily cyanide plant is to be erected, provided the ore in the group averages $30 per ton; 120 assays made averaged $37.80 per ton, and if the titles are found perfect the syndicate will buy a controlling interest in the property and erect the reduction works.

The Roanoke Mining and Milling Company, a syndicate of Michigan City, Ind., capitalists, have miners at work on their claims on the south bank of the Similkameen river. It is the intention to continue the development work until the tunnels are run 500 feet. When the Roanoke tunnel has penetrated the mountain 500 feet reduction works will be erected of sufficient capacity to handle the output.

BRITISH COLUMBIA.

Spokesman-Review: For the first fifty days of the present year the Le Roi mine has averaged in shipments 100 tons of crude ore daily. Now, since the compressor is in operation, and the gravity tramway ready for business, when the new hoist is in position and operating the output of the Le Roi mine will be increased fourfold.

In the Center Star, which adjoins the Le Roi, the main tunnel is now in over 1400 feet, and is within 70 feet of the east end line of the Le Roi.

On Monte Cristo mountain the mines are being developed night and day. No less than four mines on this hill are being developed by power drills. They are the City of Spokane, Colonna, Monte Cristo and Iron Horse.

The Walters Company has secured an option on a four-fifths interest in the Pilgrim for $80,000. The bond is to be taken up on March 4. It is understood that the Walters Company is acting in the interest of Toronto and Montreal capital. This company also hold a bond on the Gem and Tiger fractions, which adjoin the Pilgrim, and it is their intention to consolidate the three in one company. This will give an area of about twenty acres.

Nelson *Miner*: The following is the product of the mines of the Kootenay country for this year up to February 20:

ORE EXPORTED.

	Tons.
From Slocan via Kaslo	42423¼
From Slocan via Nakusp	1597½
From Rossland via Northport	2670¾
From Rossland via Nelson	16¼
Total	8538½

Total value—

Through Nelson custom house	$489,477.94
Through Revelstoke (Nakusp)	174,416.65
Total	$663,894.59
Average value per ton	77.77

PRODUCE OF SMELTERS (SHIPPED).

	Tons.
Nelson (Hall mines) matte	357
Trail smelter matte	1304¾
Total	1661¼
Total value	$ 632,906.00
Total value ore and matte exported	1,296,800.59

ALASKA.

Mining Record: There arrived Feb. 10 the first party this winter from the Yukon country. Speaking of the shortage of supplies at Circle City, they say there is plenty of nothing but sugar. Flour has sold as high as $50 per hundred.

A greater amount of winter drifting than ever before has proved profitable on Eagle creek.

Of the Clondyke strikes, they say the Clondyke river is a stream about forty yards in width at the point of its confluence with the Yukon, about fifty-five miles above Forty Mile, and is about such a stream as Forty Mile creek. Its principal tributaries are Bonanza and Hunker creeks, each about twenty miles in length. The gold of this district is invariably found in the beds of the streams, there being no bench diggings. The pay streak runs from 3 to 6 feet deep and lies under from 12 to 20 feet of gravel, and the district is distinctly and entirely a winter diggings, sinking and drifting being only practicable when the gravel is frozen.

One hundred and ninety-two claims are staked out along Bonanza creek, extending a distance of twelve miles, 102 miles below and ninety miles above the discovery claim.

The gold of the Clondyke section is coarse and dark, carrying considerable adhering quartz. A number of nuggets taken out on Bonanza creek will weigh from $3 to $13 each.

Claims are allowed extending 500 feet along the streams, from rim to rim, and the Canadian authorities demand a fee of $15 from the locator of each claim. The best claim thus far opened up on Bonanza creek is No. 22 above discovery, which was sold by P. C. Richardson for $6000, half cash, balance "on bedrock."

News: The class of capitalists who so far have invested here are men with means to put their acquisitions on a paying basis. Of that class might be mentioned the Julian Mining Company, which built a 10-stamp mill at Berner's bay last fall; the Nicolai Company, which will build one this spring of like size on the Horrible lode; the Bald Eagle Company, the Sum Dum Chief Gompany, the Windham Bay Company, the Ebner Gold Mining Company and the Boston & Alaska Company, which has just begun operations at Funter bay. The latter gives promise of developing into a plant second in magnitude only to the Treadwell Company.

The Sum Dum Chief Mining Company has begun active work for the season. A complete 10-stamp mill has been ordered, workmen are framing the mill timbers, and everything will be on the mill site ready for erection by March 15.

The Nowell Company has under consideration the addition of fifteen stamps to their Sheep creek mill. There will be a large mill built on the Ready Bullion claim this summer and probably one on the 700-foot claim adjoining Treadwells. The Mills property, on the north shore of Holkham bay, now under bond to a French syndicate for $250,000, will be thoroughly developed early in the season.

UTAH.

TINTIC DISTRICT.

(Special Correspondence).—The Tintic Mining and Development Company is driving a tunnel into Mammoth mountain to tap the Sioux vein, which they expect to strike by going 4000 feet. This is to be a royalty tunnel, but the company expect to cut through their own ground at 2100 feet from the mouth, at 1400 feet depth.

The Emerald shaft is down 455 feet. Some drifting is being done, and several chutes of low-grade ore have been found. The purpose is to sink 700 feet.

The Grand Central, lying adjacent to the Mammoth, on the same side of the hill, has a shaft down 700 feet; has 1000 feet of drifting on the 200-foot level and is in ore; has 500 feet of drifting on the 400-foot level and 800 feet at the 700-foot level. The property is well equipped, and, while not now a shipper, there is strong likelihood of its soon becoming one.

The Apex is a promising prospect on the south slope of Mammoth hill. Its owners are doing some systematic work prospecting for the Centennial-Eureka vein, which is on the opposite side of the hill.

At Silver City, the Silver Park tunnel is in 800 feet and a shaft is being sunk. The management contemplate putting in hoisting machinery.

The Four Aces shaft is down 485 feet, is equipped with a gasoline hoisting engine and has shipped some carbonate-lead ore. Levels have been run every 100 feet. Ores on the lower levels are said to run as high as 80 ozs. silver and 30 per cent lead.

The South Swansea shaft is 450 feet deep, with levels every 50 feet. The workings connect with those of the old Swansea. The work now in progress is principally development and blocking out the ore. Ore on every level has been found, which is silver-lead sulphate. Very little of it is oxidized. The ores of this part of the district are in porphyry and run 40 ozs. to 60 ozs. silver and .20 per cent lead, though some of the high grade runs as high as 120 ozs. silver. The South Swansea is shipping about 300 tons per month. The old Swansea shaft is down about 600 feet, and production and development goes steadily on.

WASCOTT.

Mammoth, Utah, Feb. 16th, '97.

Mercur *Mercury*: Lillian Russell shaft on the La Cigale is going down at the rate of 6 feet a day, and the drifts north from the 100 and 200-foot levels are being driven at a like rate of speed. The plans of the company for a mill are completed, and early in the summer ground will be broken for its erection. The mill will have a capacity of 500 tons, and will be complete in all its details. The ore will need no handling after being hoisted, the machinery taking it from the ore bins to the crusher, the tanks, and will even carry it out on the dump.

The Wonder shaft was down last week to a depth of 650 feet.

Kislingbury, Jenkins and Clements have been sampling the Sacramento in the interest of Capt. De Lamar. Manager Bothwell says that no option has been given on the property, nor any price quoted.

Salt Lake *Tribune*: The output from the Bullion-Beck property at present is perhaps larger than that of any bonanza in the State, the shipments of crude ore amounting to about 2500 tons a month with the concentrates reaching a total of nearly 1000 tons. It is said of the ore that rarely has its values exceeded those of the present time, the high grade showing an increased amount of gold as depth has been attained, while the argentiferous values have maintained a uniform figure.

On the West Dip at Mercur extensive development work is being done, with most gratifying results. The showing at the La Cigale continues as work progresses, as do the Daisies and there is every indication that the rush to that locality will increase with the opening of spring. The snow there is yet at such a depth as to render intelligent prospecting almost impossible, although hundreds of claims have been staked off.

The Mercur Mining Company will within two weeks increase the capacity of their milling plant to 300 tons daily. To accomplish this will involve but little expense, the only thing necessary being an increase in the tankage and a heavier crusher. At present the mill is handling a little over 200 tons a day that afford a monthly dividend in the sum of $25,000, and with the increase the impression prevails that this will be swelled to at least $37,500.

At Frisco the mill upon the property of the Horn Silver Mining Company, which has paid over $5,000,000 to its stockholders, has been shut down, and about 100 employees at the mine and concentractor laid off. At the offices of the company in this city it is claimed that the shut-down was simply to enable the management to make needed repairs on the mill, and that this having been done the property would start up again.

All three of the Salt Lake smelters are quite busy in turning out bullion, and their ore supplies keep up well. The past few years there has been such sharp competition in smelting as to necessitate the adaptation of labor and fuel-saving devices to cut down the cost of reduction of ores into bullion and matte.

The Chloride Point Consolidated Mining and Milling Company have decided to erect a 100-ton mill at their property in the Camp Floyd district, and it is understood that the work of construction will begin at an early date.

MONTANA.

Manager Knippenberg in his annual report of the Hecla Consolidated Mining Company shows the production for 1896 to have been: Silver, ozs., 382,735; lead, lbs., 2,776,805; silicia, lbs., 3,358,039; iron, lbs., 1,510,520; zinc, lbs., 1,784,495. The net value of bullion and matter shipped during 1896 was $283,474.90, which with receipts from other sources made up a total of $286,823.19. The expenditures, not counting dividends, were $249,950.31, leaving a net cash profit of $26,372.88.

Inter-Mountain: The Montana Ore Purchasing Company are negotiating for the McNamara interest in the Snohomish mine for $75,000. The property is now being worked under lease, and is developed by a shaft 450 feet in depth and numerous crosscuts and drifts.

Miner: At the Bi-Metallic mine in Granite county, which has produced $32,000,000, and has paid $12,000,000 in dividends in nine years, the machinery for starting to work over the tailings that have accumulated for so many years, is about ready and it is said that the mill will not again shut down. After the tailings are used up it is probable that the mill will be kept running from the ore that is taken from the mines.

On the High Ore work has been suspended on the tunnel, which is in 1,185 feet. In driving several veins carrying good values in gold, silver and lead have been cut. The objective point of the tunnel is still about 400 feet ahead. It is expected that work will soon be resumed.

SOUTH DAKOTA.

Black Hills *Times*: P. L. Gibbs, principal owner of the Omega mine, adjoining the Homestake, is negotiating for the erection of a leaching plant in connection with his stamp mill situated at the mouth of Blacktail on Deadwood gulch. The new plant will be operated under the cyanide or chlorination method.

G. W. Drew and M. V. Little of Chicago, associated with D. C. Boley, who have recently purchased the Carroll group of mines, on the Blacktail divide, and the Sunset property, west of the Gunnison and Clinton groups, propose to erect a large and suitable works for the treatment of the product of their mines, and of sufficient capacity to handle custom ores.

A new discovery of siliceous ore is reported to have been made in the vicinity of Hill City, two miles from the Sunnyside mine. The locator claims to have a vertical vein 8 feet wide that he has traced by openings on its course for 4500 feet in length.

At Keystone the Holy Terror Company employ about fifty men. The shaft is in the vicinity of 475 feet and is being pushed as fast as possible. The mine is a steady and large producer.

The Union Hill Mining Company are getting the Richmond mill in shape for the reduction of gold ores. Twenty stamps are now in position and will be dropping in a few days. The mill will be equipped with four different makes of concentrators to test their ability and capacity. The one giving the best results will be adopted and a full complement of them will be placed in position. The mill when completed will have eighty stamps.

COLORADO.

Denver *Republican*: At Cripple Creek on the Strong mine on Battle mountain the shaft is down 500 feet and the foundation has been prepared for a new 12x14 geared hoister that will see the shaft down 1000 feet deeper.

C. B. Wider has secured the Raven hill group of the Cresson Company under a bond and lease, and put a force to work prospecting the ground. The group contains thirty-four acres and ranks among the best of the indifferently prospected territory on Raven hill.

The old Eaton shaft on the Gold Dollar has been unwatered and sinking resumed. In the prospecting tunnel run, about 50 feet away from the shaft, what is undoubtedly the extension of the Lindsay-Lanterman vein has been opened, and assays from 10 inches of the ore range from $90 to $1500 a ton.

J. J. Weicher of London has purchased the bond and lease on the Caledonia on Gold hill from the Six Brothers Company, and the property is now being operated for him by the McMasters brothers, while the final sale of the property is being negotiated in London.

The Elkton during the first eighteen days in February shipped 27 cars of ore, including all grades. The Moon-Anchor Company during the past week shipped 143 tons of ore.

At Ouray the Cleopatra Mining and Milling Company announces to owners and operators of mining property tributary to Ouray that they will erect during the next three or four months smelting works for the reduction of copper sulphide, iron sulphide, siliceous and lime ores. They expect their first furnace will be in operation early in June.

The O. & N. tunnel, which has cut the American ore measures on the gold belt, shipped out a single car recently which netted over $9000 in gold.

At Leadville shipments have commenced from the newly opened Henriett shaft. A force of twenty-five men were put to work breaking ore in the third and fourth levels, about 450 feet from the surface. The ore is a lead carbonate, and recent assays show an average value of 12 ounces silver and 39 to 40 per cent lead.

NEW MEXICO.

The Baldy district has been a large producer of gold since 1866, and the product has been well up into the millions, while gold was taken from the placer workings under Spanish rule as early as 1640, and for forty years thereafter. A large portion of the district, and all of that portion which was known to be gold-bearing up to three years ago, is embraced within the Maxwell land grant, the title to which has been in conflict for many years. This was a complete bar to the investment of capital to develop the well-known rich leads. Happily, the question of title has been absolutely settled by an act of Congress, and in 1894 the district was thrown open to prospectors under conditions very similar to those relating to the location of mineral claims on government land, and in most respects more favorable. Since then thousands have gone into the newly opened fields, which have been demonstrated to be rich in gold. This includes the La Belle district, the Red River district, the Keystone district and the Hematite district.

The Aztec mine was discovered by Matthew Lynch and others in 1867, and in about nine years' working is reported to have produced over $1,250,000. This property has over 2000 feet of underground workings, most of it ready for stoping, and is said to have over 40,000 tons of ore in sight.

Other old mines in the vicinity of Baldy are the Montezuma, Rebel Chief, Legal Tender, Black Horse and French Henry groups, besides many others more recently developed. The capacity of the mines in this district, if worked to the fullest extent, is not less than 1200 tons of ore daily. Seven stamp mills, with over 200 stamps, are in operation in the district.

The Bandanna group, near Elizabethtown, consists of six very fine claims, upon which there are 500 feet of shafts and 3000 feet of tunnels, developing eight well-defined veins, ranging from 8 inches up to 3 feet in width of high-grade ores, and from 5 to 8 feet in width of ore.

On the Golden Ajax a 10-stamp mill has been in operation since last June, but has not been entirely successful in saving the values, and a concentrating plant is now being put in to handle the tailings.

In the Red River district a thirty-ton smelter was erected last November, which will be a great factor in developing the district the coming season; and though it can handle only a small portion of the ores produced, it will give a practical demonstration so much needed in all new mineral fields.

The placers constitute one of the chief sources of gold in all of the districts. The Lynch placers at Elizabethtown have been operated since 1866, and comprise a tract of about 7000 acres, carrying an average of 18 feet of auriferous gravel running not less than 30 cents per cubic yard. These placers and others in the immediate vicinity of Baldy mountain have produced more than $2,000,000. The Lynch placer is operated by a ditch 42 miles long, which cost originally over $300,000, and by two shorter ditches, which furnish a large volume of water. The Franklin placers comprise over 800 acres of ground on Red river. Over $20,000 worth of improvements were completed late last fall. The Montezuma placers, on Red river, were operated profitably last season. Near the head of Red river are the Long Canyon and Black Tiger placers, located last season and operated in a small way. In the La Belle district a Boston company, which located a number of placer claims last season, has recently purchased all the adjoining placer ground and in the spring will construct a ditch from the Costilla.

ARIZONA.

Globe *Silver Belt*: Between the Verde and Jerome there are over sixty men prospecting, most of them having gone there recently on account of the striking of a large ledge, assaying high in gold and silver.

John W. Garrett of the Baltimore & Ohio Railroad, Arthur A. Brownlee of New York and Thomas R. Lombard of Chicago, through the efforts of W. O. O'Neill of Prescott, have become interested in the Grand Canyon copper mines, owned by F. R. Nellis and others. The bond covers twenty claims and runs eighteen months, the price fixed being $85,000.

Mr. Backstein, who has bonded several mines in the Lone Star district, and who went to St. Louis recently to buy a smelter and other machinery, has made the purchase and the machinery is now in transit.

There are sixty men employed extracting ore and freighting it to the Rosemont smelter, which, it is expected, will blow in in a few days.

Tucson *Star*: At the Pierce mines the out put is larger than ever before. Two pulverizing mills have been purchased and are in transit and will be erected and in operation within sixty days. The capacity of these mills is fifty tons each, making a total of 100 tons per day.

Journal-Miner: A shipment of $20,000 in gold bullion was made last week from the Harqua Hala mines.

The Sundance Company is awaiting the arrival of new machinery for their mill, which they propose to erect at their Silver Trail mine.

Despite the reports to the contrary, the present lessees of the Bonanza mine, at Harqua Hala, will probably make application for a renewal of the lease at the headquarters at London. Ten stamps are kept running twelve hours per day.

Phœnix *Republican*: The shaft of the Congress mine is now down more than 1700 feet and has been in pay dirt all the way.

The copper mines near the Grand canyon, back of Flagstaff, are bonded to Eastern capital and are developing into big producers.

It is reported that Wm. Stiles and Felix Mayhew of Casa Grande have sold their recently discovered copper property, a few miles south of that town, for $60,000, and that a smelter will be placed on the ground at once. It is understood that the Silver Reef properties have just changed ownership for a consideration of $75,000.

Scientific Progress.

The Quacks and Electricity.

In a recent address Dr. George M. Sternberg spoke on "Pseudo Science in Medicine," and described the use made of the electric belt, "microbe killer" and the X-ray by the army of quacks "who trade upon the imperfect knowledge of the masses, and by plausibly written advertisements convince many, even of the educated classes, that their particular method of treatment is based upon the latest scientific discoveries." Continuing, Dr. Sternberg says:

"A Franklin draws lightning from the clouds; a Galvani shows that an electric current may be developed by the contact of metals, and that such a current causes muscular contraction, and innumerable patient investigators add to our knowledge of electricity. The scientific physician avails himself of this potent agent for the treatment of certain ailments in which it appears to be indicated, but admits that he meets with many disappointments in his clinical experiments. The pseudo-scientific quack writes, or has written, advertisements in which fact and fiction are so commingled that even educated persons may be deceived, and, having aroused interest in the alleged therapeutic value of this mysterious agent, offers his electric belt or finger ring made of two metals, or pocket battery, as a sure cure for certain specified ailments, or, if less modest and more certain of the credulity of the public, as a cure for all of the diseases to which man is subject."

METALLURGISTS now think they know why a piece of red-hot tool-steel becomes flint hard when suddenly quenched in water. For years they have been satisfied with the explanation that the shock drove the molecules of the steel into closer contact, hence the hardness; but this theory was completely destroyed by the fact that the volume of the hardened steel was greater than that of the unhardened material. After five years' search the metallurgical department of the Sheffield Technical School has solved substantially this difficult problem. It had been necessary to employ very intricate physical apparatus, the object of which was to measure accurately what seemed a paradox, namely, how much hotter a piece of steel became on cooling, and how much cooler it became on heating. These phenomena were due to the formation or dissociation of compounds within the steel itself. The result of the researches showed, almost beyond doubt, that the almost diamond hardness of quenched steel was due to the presence of a remarkable subcarbide of iron, and that the action of tempering was due to the fact that far below red heat this compound decomposed and diluted the mass with soft iron. The permanent magnetism of steel depended on the amount present of this compound.—Mechanical Engineering.

AN English exchange tells of a remarkable invention it is proposed soon to bring out in England called petrifite. It is stated to be a combination of well-known inexpensive substances which has the property of rapidly binding together or solidifying, without pressure or mechanism, almost any materials that can be named. It is said that even water itself, fresh or salt, and most liquids become solidified and transformed in twenty-four hours into insoluble stone or rock. The invention, which can be used either as a perfectly white powder or as a liquid, is added in varying proportions as required. An ordinary mixing mill and a pulverizer are the only machines necessary for the manufacture on a large scale, and smaller quantities may be treated by hand alone. Among the numerous applications to which it is claimed that petrifite can be made may be mentioned buildings, paving, aqueducts, reservoirs, tunnels, embankments, bricks, tiles, concrete and cement. It is thought that it may also be used as a binding material in coal briquette manufacture, one part of petrifite to thirty or even forty parts of dust, making a solid briquette without pressure. Where a hard briquette is required it is advisable to use the present ordinary briquette presses instead of increasing the proportion of petrifite.

Electrical Progress.

Unique in Its Motive Power.

An interesting installation is now under way at Middletown, Conn., where the Keating Wheel Co. have completed a factory unique in its construction and in the application of its motive power. When complete the factory and offices will cover a space of 168,250 square feet, of which about 150,000 square feet will be devoted entirely to bicycle manufacture. The establishment is divided into three buildings of brick and stone. The main building is 1000 feet long, 50 feet wide and two stories high. Projecting from this on the river side are six Ls, each one of which is devoted to some special operation on the wheel. Reference to the plan shows the different apartments which occupy these Ls. The main L—200 feet long, 50 feet wide and two stories high—is the repair department and the store room.

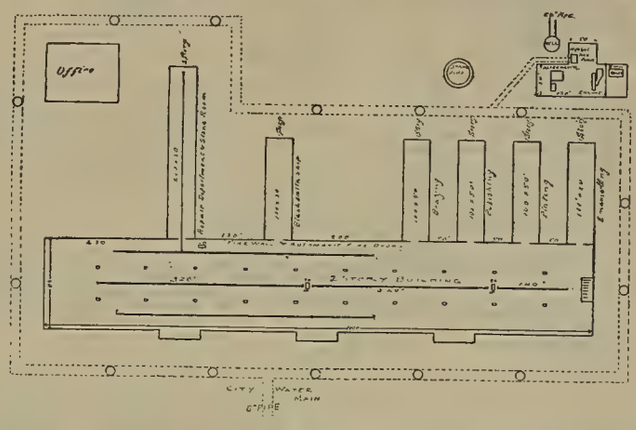
The unique feature of this factory lies in the fact that it will be entirely operated by electricity, not an engine or a main belt coming into the factory proper. The system chosen is the three-phase system of the General Electric Company, now in use in many power transmission and distribution plants throughout the country.

The engine and generating plant are located in the southeast corner of the plot in a two-story brick and stone building. Steam is generated by a Babcock & Wilcox boiler of 250 H. P., separated by a brick partition from the engine room. The engine—of 500 H. P., the high pressure side only of which is installed—is erected upon the second floor upon brick and stone cap piers built up from the ground. On the same floor is a General Electric three-phase generator, known as an A-T 16 pole, 250 kilowatt, 450 revolution, 60 cycle machine, also placed on piers carried up from the ground. The main belt from the engine and fly wheel passes down to the ground floor, where a countershaft runs in bearings set upon brick and stone piers. The shaft is carried the entire length of the room and from it will be driven, eventually, another three-phase machine, probably of similar capacity, as well as a set of lighting machines.

The exciter for the generator is a 4½ kilowatt machine of the I. B. type, run from a pulley on the shaft of the three-phase machine.

The main building, 1000 feet long, is one great hall, supported on rows of pillars 10 feet apart. It will be seen by the diagram of the building that the main shafting is about 800 feet long and runs down the central aisle, being divided into three sections, between each of which is a 50 H. P. General Electric induction motor of the inverted type. There are other shorter lines of shafting, which are about 350 feet long, one on each side of the main shafting in the north part of the building. Still another line of shafting, about 250 feet long, runs through the repair department. The motors driving the shafting in the main building are two 50 H. P., while the line of shafting running through the repair shop is driven by a 20 H. P. motor, secured to the ceiling of the first floor in the main building.

All of the motors are equipped with two pulleys on each end, so that four independent shafts can be driven from each motor. The extent of this shafting and the method of driving the motors can be gathered from the illustration made from a photograph taken from one end of the main building. There is about 160 feet of shafting on the other side of the far motor shown in the picture. This will give some idea of the extent of the installation.



LAYOUT OF THE KEATING FACTORY AT MIDDLETOWN, CONN.



VIEW OF KEATING FACTORY JANUARY 30, 1897.



FIRST FLOOR OF MAIN BUILDING; ROOM 1000 FEET LONG.

THE world's submarine cables now number more than 1300, according to the recent presidential address to the London Institution of Electrical Engineers. They have an aggregate length of 162,000 nautical miles, over half of them being less than five miles long, while eight of them exceed 2000 miles. They represent a total expenditure of about $200,000,000, about 75 per cent of which is British capital. A fleet of forty-one repair ships is maintained. The electrician can localize the breaks in a cable closer than the captain can sail his vessel, yet a break on one of the Anglo-American lines costs almost half a million dollars to mend—this being probably the most expensive repair on record. It is possible to transmit nearly fifty words of five letters each per minute on the Atlantic cables by an automatic transmitter.

Mechanical Progress.

Improved Method of Filtration.

Frank H. Mason, United States Consul General at Frankfort, Germany, writes that there is in operation at Worms, Kiel and several other places in Germany an improved system of filtration of water on a large scale. The new system is the invention of Director Fischer, waterworks engineer of the city of Worms, where the use of Rhine water for general purposes presented the same problem that confronts cities like Cincinnati, St. Louis, Cairo, and others which derive their water supply from the often turbid rivers of the Mississippi valley. The germ, or fundamental idea, upon which the new system is based is the fact that clean, sharp sand, when mixed in due proportion with finely pulverized glass, which may be derived from the waste of glass works, old bottles, etc., forms a porous mass, which, by baking under a high temperature, may be hardened in any desired form. The inventor in this case hit upon the plan of molding this porous cement into hollow plates, or plaques, about 40 inches square and 8

inches thick—that is, with walls 3 inches in thickness and about 2 inches of hollow space at the center of the plaque.

In constructing the filtering plant, these plates are set upright in groups or batteries of any number, according to the desired size and capacity of the establishment, and are ranged along the lower portion of one or more tanks of hydraulic masonry, where they can be covered to a depth of 3 or 4 feet with the water to be filtered. The water is then forced by its own pressure through the porous walls of the plate into the interior hollow space, where it trickles down and is drawn off through pipes, laid at the bottom of the tank, to the reservoir which receives the filtered water. These discharge pipes are rigged with cocks so that each plate and group of plates may be isolated for cleaning or other purposes while the adjacent batteries are in operation. For greater economy of space and tubing, two tiers of plates are set, one above another, in the usual manner, whereby both tiers are served by one set of discharge pipes. The water, in passing through the 3-inch walls of vitrified sand, is filtered as perfectly as by traversing 3 feet of loose sand or gravel in the ordinary sand-filtering process. The plates, being set upright and close to each other, increase from eight to ten fold the filtering surface that may be condensed within any given superficial area, thus securing an important economy of space within frost-proof constructions, and where, as is often the case, land is costly and difficult to obtain.

Nor is this the only, or even the principal, advantage of the new system. Every practical waterworks engineer knows the delays, labor and expense involved by turning sand filters out of circuit and cleansing them of the mud and detritus which collect so rapidly at the bottom of the tank. With the plaque filter, the cleansing operation is easily and quickly performed by simply reversing the current of water, that is, turning it backward through the discharge pipes into the hollow plates, whence it percolates outward through the porous walls into the tank, dislodging readily the dirt that has collected on the outer surface. This falls to the bottom of the tank in which the plates are submerged, and is draw off in liquid form, assisted, when the accumulation is large, by means of a hoe or shovel, and followed by flushing with a hose.

Practical Information.

Pig Iron Production.

So far the available statistics enable a conjecture to be made of the pig iron output of 1896. It is likely to be by far the largest on record. The best estimates that can be made place it at 30,500,000 tons, of which the contributions that can be appraised with apparent confidence are the following:

	Tons.
Great Britain	8,650,000
United States	8,623,000
Germany	6,200,000
France	2,250,000
Russia	1,600,000
Austra-Hungary	1,300,000
Belgium	650,000
Sweden	550,000
Total	30,123,000

And when to this we add contributions from Canada, India, Italy, Spain, China, Japan, Mexico and other countries, we can depend upon it that we are rather under than over the mark. —Iron and Coal Review.

A SPECIAL from Chicago over the Chicago, Burlington & Quincy and the Burlington & Missouri railroads reached Denver, Col., at 3:52 A. M. Feb. 16th, having traveled 1026 miles in 18 hours and 52 minutes. This journey goes into history as the greatest railroad feat ever accomplished. On straight stretches of track the train covered more than sixty miles an hour. The mountain climb from Akron, Col., to Denver, 118 miles, was made in 124 minutes, the train running an even mile a minute much of the distance. This record is considerably better than any previously made. The average speed was .906 mile per minute. The record before had been held by a New York Central special, which made the run from New York to Chicago, 964 miles, in 19 hours and 57 minutes (1197 minutes), an average of .805 mile per minute.

ALUMINUM BRASS is used extensively in places where strength is required, especially in electrical work and the electrical attachments for wires on trolley work, both overhead and underground. The use of aluminum also makes brass very tough, and one can take brass with a few per cent of aluminum in it and bend it into all sorts of shapes and forms without breaking it; whereas, without the aluminum, it would not stand one-half the amount of work which it will with it.

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Gold Medal, Columbian Exposition, 1893.
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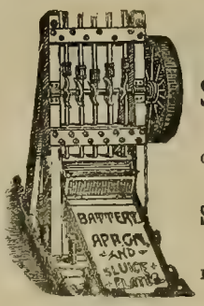
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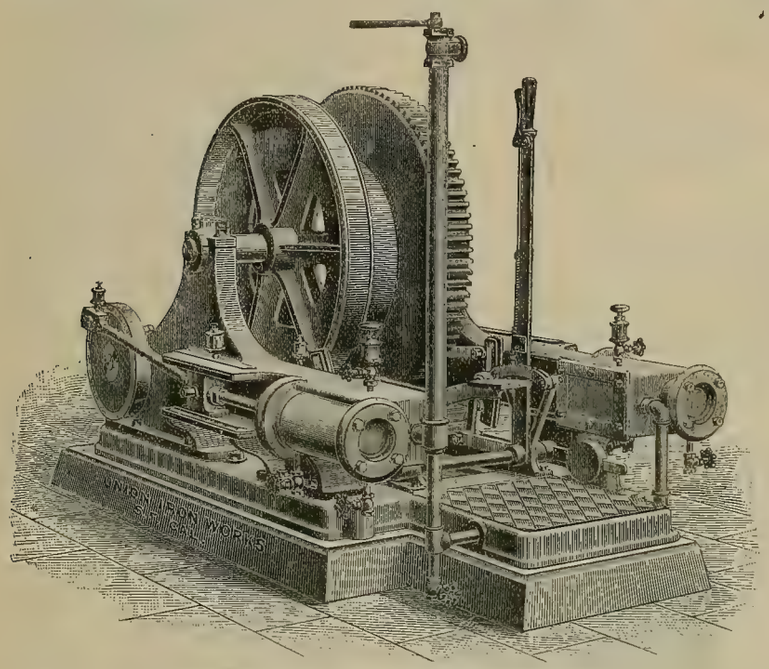
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The general lines upon which this hoist is designed are neat, strong and substantial and all the operating parts are conveniently arranged.

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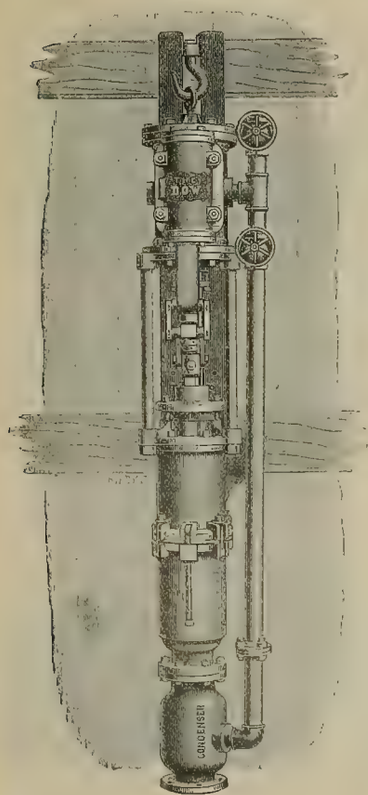
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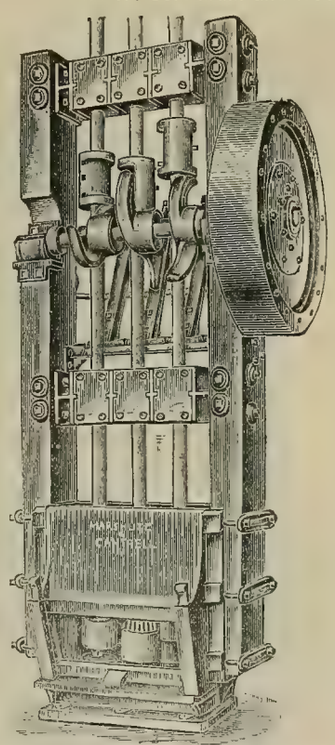
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Jan. 25, '97. E. H. SCHAEFFLE, Murphys, Cal.

Coast Industrial Notes.

—J. H. Wadsworth is erecting an artificial ice plant at Yreka, Siskiyou county.

—The Government of Colombia has voted 6,000,000 francs for the purchase of more warships.

—Receiver Clark has contracted for 15,000 tons steel rails for the Union Pacific and 5000 tons for the Oregon Short Line.

—The Los Angeles Edison Electric Company has called a meeting of stockholders for March 20th to authorize the issue of $500,000 bonded indebtedness.

—A corporation has been formed, called the Truckee & Lake Tahoe Railroad Company, for the purpose of building a road to the lake, with a terminus at Tahoe City. The directors are capitalists of Nevada or men who have been prominently connected with the Comstock.

—The Arizona Legislature is asked to grant exemption from taxation for ten years to a proposed railroad to the Globe district, to be called the Santa Fe, Phœnix & Globe. Globe is one of the best mineral regions in the West. For years it has thrived with hauling done 120 miles. Even now hauling is done seventy miles.

—Dr. Thos. Addison, coast representative Gen. Electric Co., considers as almost definitely assured the plan to establish a large electric plant at the Corral Hollow, Cal., mines to furnish light and power to Oakland, Berkeley and Alameda. The scheme includes the building of forty-two miles of line and the generation of 10,000 H. P. at the mines.

—The regular rumors of the usual annual "fishermen's strike" are reported from Astoria, Or., where the most profitable business on the coast is conducted. From a little strip of water is annually lifted $3,000,000 worth of salmon, it being all harvest, there being no sowing or cultivation. The canners and fishermen have a chronic grievance against each other, and all efforts to induce a good understanding and business co-operation are thwarted by a few on each side, who find profit in fomenting discord.

—At the beginning of the work on the Transsiberian Railway, the Transbaikal and Amoor section was planned to extend from Chita through Sretensk, on the shores of the river Shilka, to Pokrovskaia; thence along the northern shore of the river Amoor to Khabarovsk, to join the Ussuri Railroad, (running south to Vladivostock). But investigation clearly showed that the construction of a line in that section involved such technical difficulties as would greatly increase the cost of the undertaking. Thus, for example, on the Sretensk-Khabarovsk section, 1667 versts (1105 miles) long, the cost per verst (0.663 mile) would amount to the sum of 90,000 rubles ($46,260). This first raised the question of building the Transsiberian Railway through Chinese territory, and investigation made in Manchuria showed that it would not only cheapen and shorten the construction of the road, but would present other advantages. Negotiations were begun on this subject, and the result was that the Chinese Government gave a concession to the Russo-Chinese Bank, and a new company, called the Eastern Chinese Railway Company, was formed, which is to construct and work a railway within Chinese territory. The articles of association of the new company were sanctioned by the Czar Dec. 16, 1896, and by an imperial ordinance issued on Dec. 23, 1896. The details of the arrangement are these: The association has been organized on the strength of the convention concluded Aug. 27, 1896, by the Chinese Government with the Russo-Chinese Government Bank for the construction and exploitation of a railroad within the boundaries of China, from a point on the western frontier of the province of Heilung Chang to a point on the eastern frontier of Kirin, and to be connected with the branches of the Transsiberian Railway which the Russian Government intends to build. The company may, with the permission of the Chinese Government, work, in connection with the railroad or separately, coal mines and other mining, industrial and commercial enterprises in China. In case such enterprises should be worked independently of the railroad, then the company must keep a separate set of books for each of them. The Russo-Chinese Bank takes upon itself the duty of organizing this company, and, when the same is organized, all the rights and duties concerning the construction and exploitation of the line granted by the abovementioned convention are conferred upon the company. The company will be considered organized as soon as the Government Bank presents to the Minister of Finance proof that the founders of the company have paid in their first installment of the shares, and they should be paid in not later than two months after the confirmation of the articles of association. The balance of the shares should be paid in, according to their nominal value, not later than a year after the organization of the company. Shares can be held only by Russian and Chinese subjects. According to the convention, the company will own the Chinese Eastern Railway during eighty years after the opening of the whole line. The new line will begin at the Onon station of the Transbaikal Railroad and will cross the Chinese frontier near the town of Staro-Zurukhait; it will run in Manchuria toward the towns of Cicikar (Tsitsikar), Khu-lan-Chen and Ning-tu and connect with the Nikolsk station of the South Ussuri Railroad. The total length of the Manchuria Railway will be 1920 versts (1273 miles), of which 1425 versts (945 miles) will be in Chinese territory.

Cripple Creek—Its History to Date, Illustrated.

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Personal.

RUSSELL L. DUNN is in London, where he went from Paris after his return from Siberia.

THE new office of Manager Graham of the Vulcan Iron Works of San Francisco is at 505 Mission street.

CAPTAIN GILLETTE, of the United States Debris Commission, has been in Plumas county, Cal., inspecting dams.

D. H. JACKSON of Oakland, Cal., will next week resume active operations on his El Dorado county property.

LIEUT. R. E. LOPEZ of the Washington navy yard is ordered to the Union Iron Works of San Francisco as inspector of ordnance.

CHARLES F. HOFFMAN, accompanied by his son, Ross, reached St. Petersburg, Russia, January 1st, on his way to Siberia. The mines he goes to are on the Amoor river.

BERTRAM HUNT, California and Nevada agent of the Gold and Silver Extraction Co. of America, L'Ud., has moved his office from 23 Stevenson St., to 216 Sansome St., San Francisco.

PROF. R. A. F. PENROSE, president of the Commonwealth Mining Company, is a candidate for the Governorship of Arizona—an appointment that will be made by President McKinley.

JAS. SPIERS JR., of the Fulton Engineering and Shipbuilding Works, has returned from the Confidence mine, Tuolumne Co., and from practical experience realizes the need of road improvement.

HORACE F. BROWN, M. E., of Chicago, who has been putting in one of his roasting furnaces at the Planet-Saturn mine, Arizona, is visiting El Dorado county, Cal., which he first saw thirty-eight years ago.

WILLIAM HAMMOND HALL, of this city, formerly State Engineer of California, has been in London for some time past, and last week sailed for South Africa with John Hays Hammond. He goes to make an examination of the water supplies of the Rand for the Consolidated Gold Fields, or the Rhodes outfit.

BINGER HERMANN of Oregon is slated as Mr. Lamoreaux's successor as commissioner of the general land office. Mr. Hermann has served twelve years in Congress, is thoroughly conversant with the requirements of the position, is friendly to the mining interests of the coast and not likely to be influenced in the manner so painfully peculiar in the case of Mr. Lamoreaux.

L. P. GOLDSTONE, of Grass Valley, has returned from London and will leave on the next steamer bound for Australia, where he goes to take the management of some promising properties for Bewic, Moreing & Co., one of the heaviest firms there and who deal in mines all over the world. Mr. Goldstone has been managing properties at Grass Valley for a number of years and has contributed some valuable work to the State Mining Bureau. He secured this position, which carries a salary of $7500 a year and expenses, through Louis Janin of this city.

Recently Declared Mining Dividends.

Highland Mining Co., South Dakota, one of the Homestake corporations, $20,000, payable Feb. 20—a total to date of $3,244,918.

Florence Mining Co., Montana, $10,000; payable March 1.

Le Roi, Rossland, B. C., $25,000; payable March 1. This makes a total of $325,000 since October, '95.

Idaho, British Columbia, $20,000; payable Feb. 27.

Anchoria-Leland, $6000; payable Feb. 15th.

Arizona copper mine, $48,000; payable Feb. 15.

Two Friends mine, Slocan, B. C., 2½ per cent; payable March 31.

Penn M. Co., Grass Valley, Cal., 5 cents per share; payable March 10.

Cariboo M. Co., B. C., 2 cents per share, $16,000; payable March 3.

Ontario Mining Co., Utah, monthly dividend $15,000; payable March 2.

Daly, Utah, Mining Co., monthly dividend $37,500; payable March 2.

Morning Star gravel mine, Placer Co., Cal., No. 75, $5 per share; payable March 1.

Recent California Mining Incorporations.

The Vista Consolidated Mining and Milling Company, Los Angeles; capital stock, $1,200,000—$900,000 subscribed; C. A. Lemon, San Bernardino; W. A. McGovern, C. H. Elliott, Louisa A. Litterer, J. B. Galvan, C. E. Hamilton, J. H. Morrissey, C. F. McNutt, Los Angeles; G. W. Lupton, Azusa.

Spangler Mining Co., Yreka, Cal.; capital stock, $20,000, all subscribed; M. Ruener, C. and F. Spangler, J. Piper, J. F. Hutchins, A. Nola, A. Smith, F. Huseman, Yreka.

Inyo Exploration Co., San Francisco; capital stock, $2,000,000—$1,100,000 subscribed; C. F. Kapp, M. G. Vallejo, P. B. Donahoo, A. Fuhrmann, J. Heenan, San Francisco.

Oro Vista M. and M. Co., Los Angeles; capital stock, $1,200,000—$900,000 subscribed; C. S. Lemon, San Bernardino; G. W. Lupton, Azusa; W. A. McGovern, C. H. Elliott, L. A. Litterer, J. B. Galivan, C. E. Hamilton, J. H. Morrissey, C. F. McNutt, Los Angeles.

Golden Butte Mining Co., San Francisco; capital stock, $1,000,000—$250 subscribed; G. H. Hopps, V. B. Allen, G. W. Bumm, D. F. Cooper, D. F. Lehigh, San Francisco.

Rose Hill Hydraulic G. M. and M. Co., San Francisco; capital stock, $100,000—$5000 subscribed; O. M. and E. G. Loveridge, E. Hirschler, G. E. Beach, L. Wadham.

Delta Mining Co., San Francisco; capital stock, $100,000—$500 subscribed; J. C. Franks, M. W. McIntosh, F. M. and C. E. Wilson, T. F. Blake.

Tracy G. M. and M. Co., San Francisco; capital stock, $875,000—$350 subscribed; D. E. O'Connell, W. G. Drown, J. A. Reid, E. Lichau, M. Claussenius, I. I. Brown, T. R. Bannerman.

Delta Mining Company, S. F.; capital stock, $100,000; $500 subscribed; J. C. Franks, M. H. McIntosh, F. M. and C. E. Wilson, T. F. Blake.

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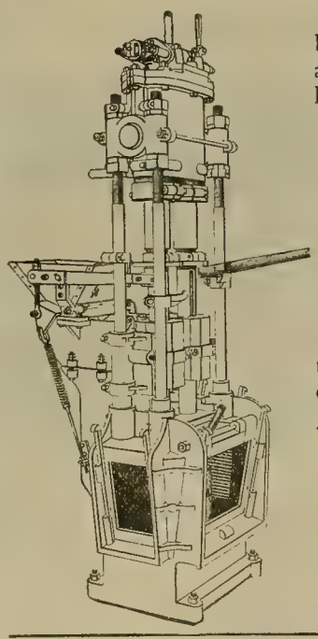
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HILL CITY, S. D., Feb. 2, 1897.

Gates Iron Works, 650 Elston Ave., Chicago, Ill.—GENTLEMEN: It gives me great pleasure in informing you of our success with the Tremain Steam Stamp Mill which we have been running since last July. We have been running on hard, white quartz, some of it of a flinty character and a small portion of it slightly decomposed. We average about ten tons every 24 hours through a forty-mesh screen. If our financial standing had been a little better, so we could have put in a small engine and rock crusher, I am confident we could put through 14 to 15 tons in 24 hours. The wear and tear is considerably less than an ordinary stamp mill, it all being on the shoes and dies. The last we used of these were of the aluminum steel, which are the best wearing shoes and dies I have ever seen. The parts are all well made and durable, I having failed to see any weak point about the machinery.

We use one cord of pine wood in 24 hours, and run the mill with 70 to 80 lbs. of steam.

I have followed mining in connection with milling for thirty years and have never seen its equal for convenience, durability and cheapness. To parties wishing to purchase a quartz mill I cheerfully recommend the Tremain Steam Stamp Mill for its small cost, economy in operation and complete results of working. Very truly yours, [SIGNED] JAMES C McDONALD, Supt. St. Elmo M. & M. Co.

This Mill has the capacity of a 5-stamp gravity mill and costs less than half to install. Automatic feeder of approved design. Weight of entire Mill 3300 lbs. Made sectional for mule-back transportation.

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577,708.—PARALLEL RULER—J. D. Barrie, Los Angeles, Cal.
577,504.—KEY FASTENER—W. F. Blanchet, Haywards, Cal.
577,505.—BRAKE SHOE—M. J. Brundage, North San Juan, Cal.
577,507.—DENTAL PLUGGER—A. Cane, Golden Gate, Cal.
577,728.—DRAWING STEAM BEER—E. Demers, S. F.
577,748.—REFRIGERATOR CAR—C. S. Hardy, San Diego, Cal.
577,552.—CAN—Hill & McKay, Portland, Or.
577,581.—BICYCLE CHAIN PROTECTOR—H. Jacoby, Oroville, Cal.
577,482.—MOWER FINGER GUARD—F. A. Kelley, Susanville, Cal.
577,756.—FAUCET REGISTER—Kelly & Vore, Oregon City, Or.
577,775.—DILATOR—N. D. Mussey, Los Angeles, Cal.
577,787.—ABSTRACTING ORES—J. P. Schmitz, S. F.
577,793.—DRAINAGE FITTING—A. C. Stewart, Los Angeles, Cal.
577,462.—OIL CAN FAUCET—J. T. Stewart, Los Angeles, Cal.
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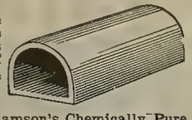
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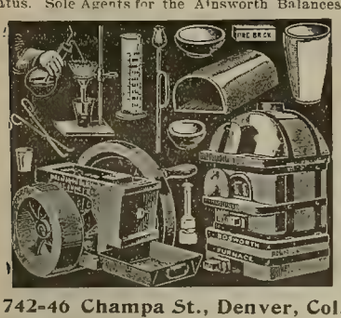


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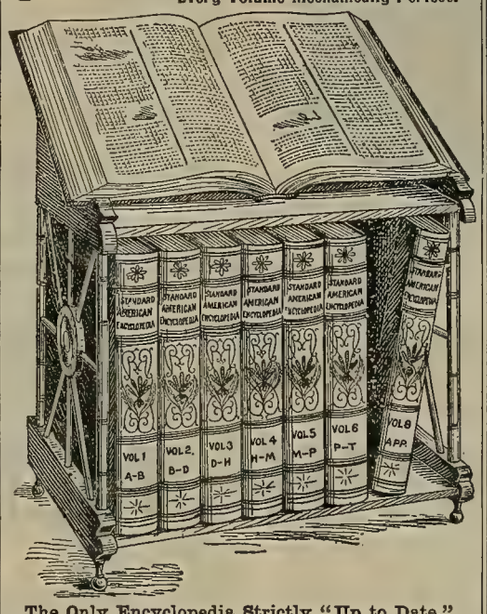
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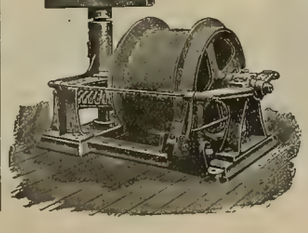
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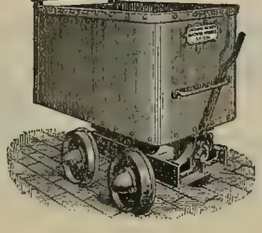
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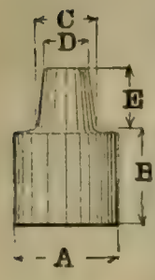
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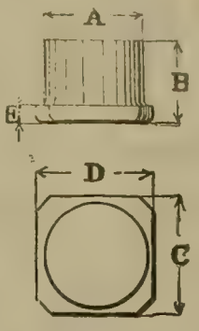
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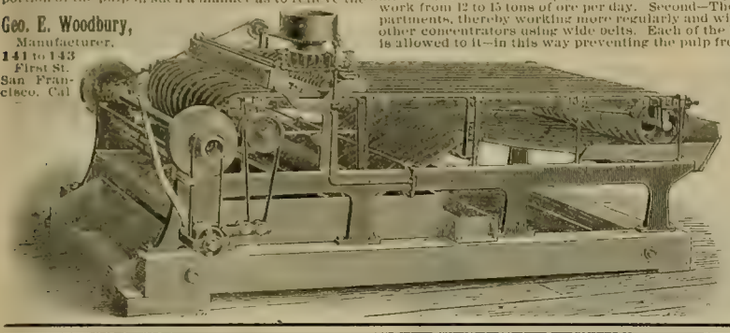
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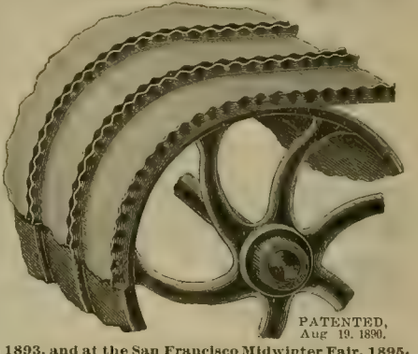
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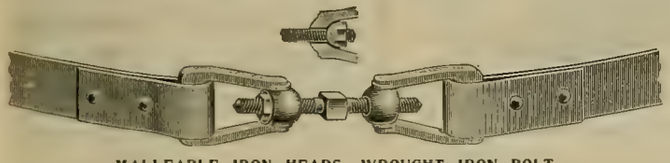


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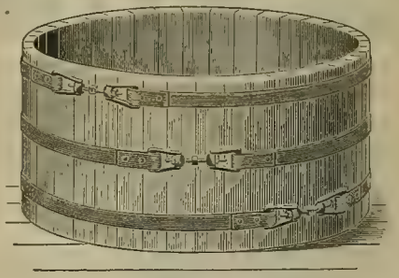
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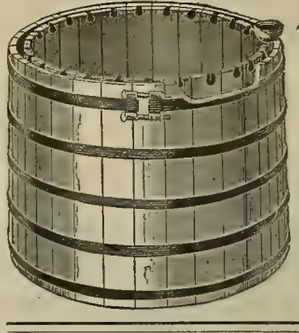
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For Heavy Mining Pump Buckets. Will outwear any other material and give best satisfaction. Samples furnished on application. A. C. NICHOLS & CO., Leather Manufacturers and Dealers, 404 Battery St., S. F.

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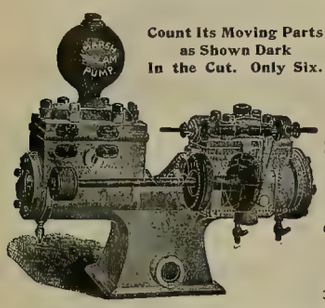
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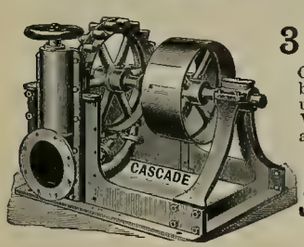
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Ores tested and amalgamation and concentration mills built to **fit the ore** and guaranteed to save what we say. Coal Mine equipments, Screens, Jigs, Tramways, Arastors, Chillian Mills, Ore Sacks, etc. Cornish Rolls, 12x20, weight 6,000 lbs., price $350; Feeders, Bumping Tables; Blake Crushers, 7x10, weight 8,100 lbs, only $250. Our 100 page illustrated catalogue FREE.



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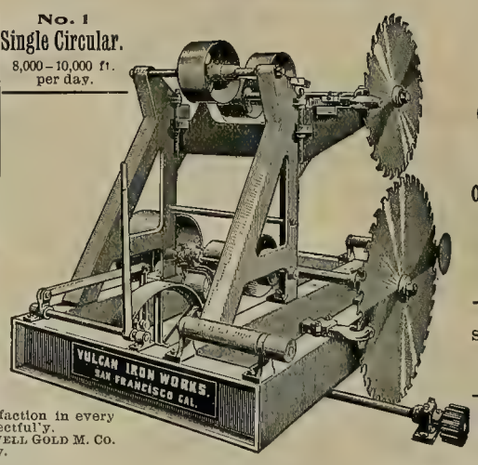
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Portable Saw Mills.

No. 0 Single Circular. 4000–6000 feet per day.
No. 1 Single Circular. 8,000–10,000 ft. per day.
No. 2 Double Circular. 15,000–20,000 ft. per day.



Alaska Treadwell Gold Mining Co.
SAN FRANCISCO.
Feb. 20, 1896.

Vulcan Iron Works,

GENTLEMEN: Our Double Circular Saw Mill of about 20,000 feet daily capacity, for which you made plans and built the machinery complete, including a set of three 6-inch beam Vulcan Head Blocks, 60-inch opening, has given us complete satisfaction in every respect. Respectfully,
ALASKA TREADWELL GOLD M. CO.
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For Mining Companies —OR— Other Consumers of Lumber at Remote Points.

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THE OLD RELIABLE!



ALBANY LUBRICATING COMPOUND

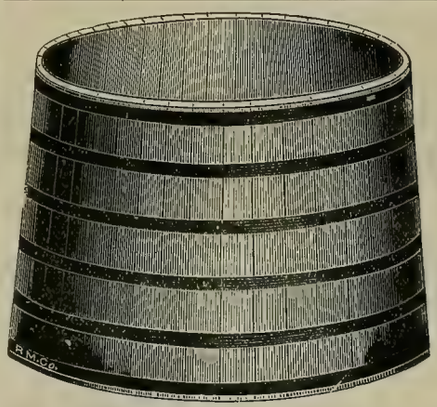
TWENTY-EIGHT YEARS' CONTINUOUS SERVICE in the great Mines, Steamships, Railroads and Mills all over the world prove it to be

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ADAMANTINE SHOES AND DIES

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CHROME CAST STEEL

Cams, Tappets, Bosses, Roll Shells and Crusher Plates.



STAMP SHOES.



STAMP DIES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

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Special attention given to the purchase of Mine and Mill Supplies.

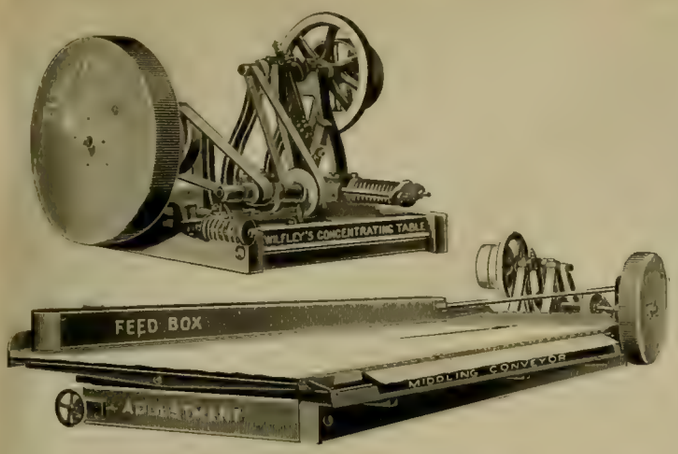


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MANHATTAN RUBBER BELTING, PACKING AND HOSE
SANDERSON DRILL STEEL,
MORRIS CENTRIFUGAL PUMPS,
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The Mine and Smelter Supply Co.,

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ARE SOLE AGENTS FOR THE

Wilfley Concentrating Table,

And claim for it BETTER work than any Concentrator made, with a capacity of from 15 to 25 tons per day of 24 hours. It is simplicity itself. No moving belts or intricate parts. Anyone can learn to operate in an hour.

For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Col.; M. E. Smith Concentrator, Golden, Col.; Mary Murphy Mine, St. Elmo, Col.; W. E. Renshaw, Mayflower Mill, Idaho Springs, Col.; W. H. Bellows, Boyd Mill, Boulder, Col.; H. E. Woods, Denver, Col.

ROMLEY, COLO., Jan. 19, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Answering yours of the 5th inst., would state that after a thorough trial we have discarded seven Woodbury Tables and two Johnsons and adopted the Wilfley Concentrating Table, which we think up to date is the best table in the market, so far as our knowledge is concerned. Yours very truly, [SIGNED] B. B. MORLEY, M'g'r Golf M. & M. Co.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

PRICE, $450.00.

CONSOLIDATED

Kansas City Smelting and Refining Co.

Incorporated Under The Laws of New York.

Capital paid in.....$2,700,000.

Buyers of All Classes of

GOLD, SILVER, LEAD AND COPPER ORES,

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SMELTING WORKS:
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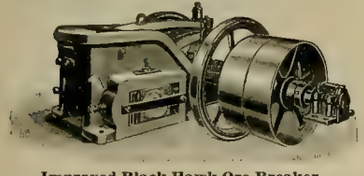
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WE ARE MANUFACTURERS OF AND CONTRACTING ENGINEERS FOR **Gold, Silver, Lead, Copper and Pyritic SMELTING FURNACES.**

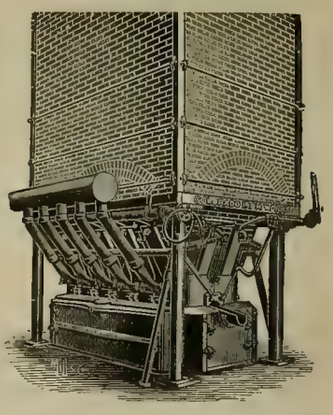
AMALGAMATION AND CONCENTRATION PLANTS.

Investigate Our Late Improvements in ORE CRUSHING MACHINERY.
We Guarantee Capacity Per Day to Any Degree of Fineness. . . . . .



Improved Black Hawk Ore Breaker.

OUR PATENT HOT BLAST APPARATUS for all Smelting Furnaces is a Success. A great economizer of fuel, and enlarges capacity of furnace.



Standard Silver-Lead Water Jacket Smelting Furnace.

Equipped with Arch-Bar System of Mantles, insuring rigid and strong walls. No Cracks.

Mining Pipe!



STEEL OR IRON.—We make pipe of either, but recommend STEEL, it being superior to iron in many particulars and inferior in none.

WRITE FOR CIRCULARS OF **The Truax Pat. Automatic ORE CARS.**

SCHAW, INGRAM, BATCHER & CO., Hardware Merchants,
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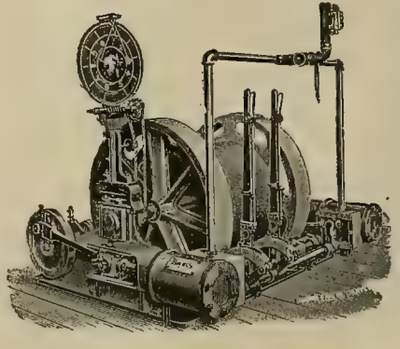
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By shipping your ores to us you can obtain the highest prices paid on competitive bids in the public market, together with a careful and accurate sample, as with our new mill and improved machinery we are able to give perfect satisfaction to all shippers. *Write for our Pocket Reference Book.* The highest cash price paid for gold bullion and old gold. Prompt returns.

STATE ORE SAMPLING COMPANY, Denver, Colo.

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LATEST IMPROVED

Patent Friction Hoisting ENGINES,

— WITH —

Automatic Alarm Bell and Indicator.

IMPROVED GOLD STAMP MILLS.

General Mining Machinery and Supplies.

Market Reports.

The Markets.

SAN FRANCISCO, March 4, 1897.

Jobbers report an increasing demand in all lines of goods. The buying seems to have taken on new life, for many merchants have discarded the hand-to-mouth way of buying and are purchasing in larger quantities. It may be that a larger consumption has compelled this course, for there has been quite an influx of persons into the gold mining districts, and also into the more favored agricultural sections of the State. Several iron manufacturers report more estimates on new work, particularly mining, structural and railroad, than at this time in 1896. So far the year opens to them under favoring auspices—raw material cheaper, crop prospects never better for a large yield, and a continued boom in the gold mining industry.

The local money market is working easier, with the premium for exchange on New York cut half in two. It is stated that it will soon be wiped out and exchange may sell below par before thirty days pass. This verifies the position taken by the MINING AND SCIENTIFIC PRESS. There is now money offered on the market with, in some instances, shaded rates of discount asked. There seems to be more inquiry for funds for investment propositions and also for other purposes, but borrowers, as a rule, want a lower rate of discount, which it now looks as if they will secure. The outward movements of California have fallen away, but they still aggregate in value nearly half a million a week.

Eastern money markets are reported fairly active, but at no advance in the rates of discount. It seems to be the prevailing opinion at the East, and also on this coast, that towards the close of the extra session of Congress, when the country will know what to expect in new legislation, business throughout the country will begin to show a marked revival. Our New York correspondent writes that "there is a noticeable hardening in the commercial paper market. The head of one of the large banks which does a good deal of business in paper tells us that in his opinion the rate for standard grades is likely to be full 4 per cent before long. The reason for this is that most of the banks and institutions which make a habit of buying paper have full lines on hand just now, and they are not inclined to extend themselves further in this direction at present. For call loans on gilt edge security the 'gentlemen's agreement' not to loan money at less than 2 per cent, which has been adhered to for some weeks by most of the leading banks in this city, has lately been departed from by two or three banks. One bank loaned over $1,000,000 at less than 2 per cent, and at least two others loaned considerable sums at the same rate."

New York Silver Prices.

NEW YORK, March 4.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	29 11-16	64⅝
Saturday	29 11-16	64⅝
Monday	29⅝	64½
Tuesday	29⅜	64⅜
Wednesday	29⅜	64
Thursday	29¾	64¾

	Copper.	Lead.	Iron.	Tin.
Friday	12 00	3 32½	10 25@12 50	13 55
Saturday	12 00	3 35	10 25@12 50	13 55
Monday	12 00	3 35	10 25@12 50	13 55
Tuesday	12 00	3 35	10 25@12 50	13 55
Wednesday	12 00	3 35	10 25@12 50	13 50
Thursday	12 00	3 35	10 25@12 50	13 50

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Dratt	7½c Prem
New York Telegraphic Transfer	12½c Prem
London Bankers' 60 days	$4.86¾
London Merchants	$4.85
London Sight Bankers	$4.88¾
Refined Silver, per oz., 1000 fine	64⅜
Mexican Dollars	51⅛@52

SILVER.—The market hung around last week's closing, but on Monday it began to ease off in London and at New York. The decline is reported to be largely due to a selling pressure brought on by press telegrams that Japan would adopt the gold standard. The crop season in India is at hand, which has some influence on the market abroad. It is stated that the call on the London market has fallen off some, which the outward shipments from America have not decreased.

MEXICAN DOLLARS.—In sympathy with silver Mexicans have eased off, which has caused exporters to buy sparingly. The market closes dull.

COPPER.—The market has held to firm prices throughout the week. Eastern advices state that the market is strong at full figures, with a continued free export movement. The production in this country, it is said, is increasing, but so is the consumption at home and abroad. Notwithstanding the heavy movements to Europe, stocks there are decreasing.

The local market is quoted as follows:

Ingot, jobbing	14½@——
Ingot, wholesale	——@13½
Sheet copper	——@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17c

QUICKSILVER.—The market is strong at another advance. It is stated that the advancing markets here and abroad is due to a smaller output. Shipments to Mexico the past week aggregated 200 flasks. Our market is quoted at $38.75 for domestic consumption.

BORAX.—The market is steady at last week's changes.

The market is quoted as follows:

Refined, in car lots	4¾
Refined, in sacks	5¼
Powdered, in car lots	5
Concentrated, "	4½

LEAD.—There is nothing new to report. The markets at the East and abroad are strong. There is an increased demand from corroders.

Our market is quoted in jobbing lots as follows:

Pig	3 75	@	3 85
Bar	—	@	4 00
Sheet	—	@	5 25
Pipe	—	@	4 50

SHOT.—There is a strong tone to the market.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 20
Drop, B and larger sizes, " "	1 45
Buck, Balls and Chilled, do, " "	1 45

TIN.—The market holds fairly firm for pig, but is irregular for plate.

We quote as follows:

Pig, per lb	14½c@—
Plate, I C coke, heavy, per box	$4 05@—
" " " light, "	3 95@—

IRON.—The market is shaded on our quotations. The demand is fair for the season.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—The War Department is asking for bids on next fiscal year's requirements for this coast. The demand for steam, gas and house is light. The general market is unchanged.

We quote as follows:

SPOT FROM YARD—PER TON.

Wellington	$8 00@— —
Greta	6 00@ 6 50
Nanaimo	6 50@ 7 00
Cuman	5 50@ 6 00
Seattle	5 50@ 6 00
Coos Bay	—@ 5 00
Cannel	8 00@— —
Egg, hard	12 00@13 00
Wallsend	—@ 6 50

TO ARRIVE—CARGO LOTS.

Australian	5 50
Liverpool Steam	6 25
Scotch Splint	— —
Cardiff	6 25
Lehigh Lump	9 00
Cumberland	13 00
Egg, hard	10 00
West Hartley	6 50

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

ANTIMONY.—The market is fairly steady both here and at the East.

Our market is quoted at 7½@8c in a jobbing way. New York mail advices quote 7½c for Cookson's, 6½@6⅝c for Hallett's and 6½c for Japanese.

POWDER.—At present market values are nominally unchanged.

The market is quoted as follows:

Hercules, No. 1*, per pound	11½c
" No. 2, " "	8½c

NAILS.—The market appears to be shaping in favor of buyers.

Wire, carloads, basis per keg		
" jobbing, " "		$2 20
Cut, carloads, " "		
" jobbing, " "		2 00

SPELTER.—There is a continued fair movement at firm prices.

We quote our market in a jobbing way at 5 cents a pound.

NICKEL ANODES.—The markets here and at the East are practically unchanged.

PLATINUM.—The inquiry is said to be fair.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC.—The market is steady at quotations.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady.

We quote in jobbing lots at 50 cents per pound for ingots.

BISMUTH.—The East reports an improved movement.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is steady to firm.

We quote in a jobbing way at 70 to 75 cents per pound.

Chemicals.

Jobbers report an improved demand, but this always obtains with the spring trade setting in. In quotations, outside of nitrate of soda, no changes are reported in either our market or at the East.

BONEASH.—The export and home demand is fair.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is reported quiet but firm at 2½c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is quiet but steady at $1.50 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a fair demand at 2½c a pound from stores.

NITRATE OF SODA.—The East reports a continued active demand, with holders able to get a further advance. Chile reports strong markets.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is quiet at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported steady from store at 6½c per pound in carboys.

SULPHURIC ACID.—The demand is light. We quote in a jobbing way at 1½c per lb for 66%.

BLUE VITRIOL.—The Eastern markets are strong and active. Ours is firm but quiet.

We quote in a jobbing way at 4½c per pound.

Mining Share Market.

SAN FRANCISCO, March 4, 1897.

The market this week sold lower under the lead of Con. Virginia. The decline is said to have been brought about by the free selling of Con. Virginia and Hale & Norcross by an outside operator. Whether the selling was for his or another person's account is a disputed point; but let that be as it may, the effect suited those who are trying to get prices down and keep them down, if possible, until outside holders are frozen out by assessments. So far as the present showing in Con. Virginia is concerned the price ruling for it is too high, but there are far too many who take chances in the hopes that a big body of good to high-grade ore may be developed. The writer will state now, as he did when the market was higher, that prices for shares are based on the quantity of ore in sight, a fair valuation of dead work and exploiting work, and a fair advance for the prospects of finding ore. On this basis Con. Virginia is not worth $1 a share and some of the other shares are also too high, while some, like Alpha, Bullion, and some of the Gold Hill shares, are too low. Three assessments were levied this week. The levying of them, with rumors of more to follow, has a depressing influence and encourages bears to sell the higher-priced shares. There is another thing that is against the market and that is, any movement to reform the management of the mines antagonizes the other interests. These interests combine to down the promoters of any move to create more honesty in mine management. This is witnessed in the combination to take Hale & Norcross from the present management and put it in control of those, so report says, whose management of the mine they control is far from satisfactory. This may be an inside move so as to destroy confidence to buy shares at as low prices as possible. It is to be hoped that the fears expressed by some as to the motives which actuate those who will get control of Hale & Norcross are groundless and that the mine will be managed on honest lines. This would make it an object lesson as to persons in control of the mines said to be wrongly managed.

The following companies report cash on hand March 1: Alpha Con., $1739; Alta, $468; Andes, $645; Best & Belcher, $4508; Bullion, $3139; Con. California & Virginia, $1788; Con. New York, $413; Crown Point, $2259; Challenge Con., $1398; Con. Imperial, $133; Exchequer, $2423; Gould & Curry, $7031; Justice, $109; Occidental Con., $204; Potosi, $3593; Savage, $7954; Sierra Nevada, $47; Union Con., $3564; Utah Con., $2921; Caledonia (Gold Hill), $2823; Confidence, $1158; Overman, $4431; Standard Con., $9566.

The following mining companies report an indebtedness March 1: Belcher, $4301; Chollar, $8000; Hale & Norcross, $196; Kentuck, $11; Lady Washington, $11; Mexican, $1000; Ophir, $2500, due bank, less $842 cash on hand; Seg. Belcher, $1000, due bank, less $294 cash on hand; Silver King, $1954.

The news from the Comstock mines is not of a character to enthuse shareholders. The general tenor of official letters filed at the different offices gives the impression that it is not ore the managements are after, but it is how to kill time, so as to pay out money and levy more assessments. Advices from Alta are practically unchanged. The letters (official) give the impression to mining men that the management is trying to see how long they can bleed shareholders before showing up ore. In Overman and Caledonia the work is on the same levels heretofore reported. They continue a success in not showing up, or, at least, none so far as the public is advised. The official letters from Seg. Belcher are as silent as an Egyptian mummy as to the reported ore found some time ago. The letters are also silent as to the levels on which work is being done. This gives the impression that more shares of these mines—Crown Point and Yellow Jacket—are wanted by the inside. The work in Crown Point is essentially unchanged. It looks as if it will be some time, probably not before more shares are secured, before ore is shown up. Nothing was heard of the past week about the ore reported taken out of the long west crossdrift that is being run by Confidence, Challenge and Con. Imperial. There is nothing new, so far as officially reported, from these mines. It looks to an outsider as if the Alpha management has its superintendent play a game of hide and seek with the west lode. It is stated that there is plenty of good to high grade ore to the west, which can be shown up when desired. From Bullion nothing of an exciting character is expected for several weeks yet, or until shares are better concentrated. From Potosi, Hale & Norcross, Savage, Gould & Curry and Best & Belcher nothing of an important nature has been allowed to leak out. No work is reported in Chollar. In Con. Virginia the work is continued on the 1000-foot, 1550-foot, 1650-foot and 1750-foot levels. From the way the market broke, it would seem as if the stringer of ore had been hid, to come into view when it is desired to make shorts fill. The reports from its different levels are

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.	Secretary.
Alma G M Co, Cal	1	5c	Feb 9	Mar 13..Mar 29	D Gutmann, 320 Sansome
Alpha Con M & M Co, Nev	18	5c	Mar 2	Apr 5..Apr 27	C E Elliott, 309 Montgomery
Andes S M Co, Nev	43	10c	Feb 1	Mar 8..Mar 31	Jno W Twiggs, 309 Montgomery
Belcher S M Co, Nev	54	25c	Mar 2	Apr 6..Apr 27	C L Perkins, Mills Bldg
Best & Belcher M Co, Nev	61	25c	Jan 26	Mar 2..Mar 23	M Jaffe, 309 Montgomery
Confidence G M & M Co, Co	1	10c	Jan 19	Feb 27..Mar 20	F Aureguy, 320 Sansome
Con Imp M Co, Nev	38	1c	Feb 16	Mar 23..Apr 13	C L McCoy, Mills Bldg
Eureka Con Drift M Co, Cal	7	5c	Jan 20	Feb 26..Mar 20	D M Kent, 330 Pine
Eureka Con M Co, Nev	14	25c	Jan 18	Feb 23..Mar 15	H P Bush, 134 Market
Jamison M Co	9	5c	Nov 27	Mar 26..May 21	Sam W Cheyney, 120 Sutter
Julia Con M Co, Nev	28	5c	Jan 21	Feb 26..Mar 19	J Stadtfeldt Jr, 309 Montgomery
Marguerite G M & M Co, Cal	5	10c	Jan 14	Feb 25..Apr 8	Chas Peach, 237 Twelfth
Mexican G & S M Co, Nev	56	20c	Mar 3	Apr 7..Apr 29	C E Elliott, 309 Montgomery
Mineral Hill M & S Co, Cal	1	5c	Jan 4	Feb 15..Apr 13	Chas Peach, 210 Sansome
Occidental Con M Co, Nev	26	10c	Feb 10	Mar 16..Apr 6	A K Durbrow, 309 Montgomery
Ophir S M Co, Nev	70	25c	Feb 5	Mar 10..Mar 30	E B Holmes, 309 Montgomery
Reward G M Co, Cal	18	2c	Feb 6	Mar 11..Mar 27	S W Backus, Mills Bldg
Thorpe M Co, Cal	5	5c	Jan 13	Mar 10..Mar 29	A F Frey, 44 Phelan Building
Troy M & D Co, Alaska	3	10c	Feb 2	Mar 9..Mar 26	O Kyst, 421 Mission
Utah Con M Co, Nev	24	5c	Jan 14	Feb 17..Mar 8	A W Havens, 309 Montgomery

ANNUAL MEETINGS.

Company and Location.	Secretary and Office in S. F.	Date.
Hale & Norcross S M Co, Nev	R U Collins, 331 Pine	Mar 10

WILL NEGOTIATE with owners or their duly authorized agents only.

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practically unchanged since our last week's review. It looks as if it is not advisable to find much ore at this stage of the game. In Ophir they continue to fool around the Central Tunnel and 1000-foot level, with nothing new reported. The official letter reports a strike on the 1000-foot level of Mexican, but it is 75 cents, not $75, a ton ore. The formation is the same as reported last week. In Union considerable work is being done, but to no purpose, outside of getting away with money for expenses. The letter from Sierra Nevada reports a small seepage of water from workings on the Layton tunnel level. A shareholder thinks it small in comparison to the seepage of money from his pocket. From Utah and Andes nothing of importance has come to hand.

From the Brunswick lode nothing new came to hand the past week. The letters on file are very largely a counterpart of those filed the preceding week. In Occidental they are working on the 550-foot, 750-foot and 850-foot levels. On the latter level bunches of ore have been found. In Chollar the work is confined to the south drift on the 500-foot level. The material is very hard. The work reported in official letters from Savage, Gould & Curry, Best & Belcher and Con. Virginia is about the same as in the letters filed for several weeks past.

The following illustrates the changes of the week:

MINES.	Feb. 25.	Mar. 4.
Alpha		
Alta Consolidated	$	04
Andes	$ 12	
Belcher	24	18
Best & Belcher	57	72
Bodie		
Bullion	12	10
Challenge		38
Chollar	94	
Confidence	1 05	95
Consolidated California and Virginia	2 00	1 65
Consolidated New York		
Crown Point		
Exchequer		
Gould & Curry		34
Hale & Norcross		90
Justice		
Mexican		29
Ophir	81	72
Overman		
Potosi	44	36
Savage	38	31
Sierra Nevada		
Union		29
Utah	07	
Yellow Jacket	30	27

San Francisco Stock Board Sales.

SAN FRANCISCO, March 4, 1897.

9:30 A. M. SESSION.

200 Alta	04	250 Kentuck	01
200 Best & Belcher	72	100 Mexican	29
300 Challenge	38	10,000 Nev Queen	04
300 Con Cal & Va	1 65	300 Ophir	72
100 Confidence	95	100 Potosi	36
300 Con Imperial	01	300 Savage	31
150 Gould & Curry	34	150 Union	29
300 H. & N	90	300 Yellow Jacket	27

SECOND SESSION—2:30 P. M.

400 Ophir	71	100 Yellow Jacket	25
200 Gould & Curry	32	100 Belcher	18
150 Best & Belcher	71	100 Bullion	10
280 Con Cal & Va	1 55	100 Challenge	37
100 Chollar	01	5700 Nev Queen	04
300 H. & N	87		

Complimentary.

The MINING AND SCIENTIFIC PRESS of San Francisco, in its issue of February 20, devotes the front page to an illustrated account of the La Belle gold fields. This journal has the largest circulation of any mining journal in the United States, and the good that it has done the mining interests of New Mexico during the past three or four years is simply incalculable. It is seldom that an issue of this widely read paper appears without an extended account of some of our mines. As a matter of reciprocity, this journal deserves the support of the mining interests of the whole Territory. It follows closely the very latest inventions in mining machinery, contains reliable mining news from all parts of the world, and is simply indispensable alike to the working miner and the mining investor. —*Daily New Mexican, Santa Fe.*

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Rainfall and Temperature.

The following data for the week ending 5 A. M., February 3, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week.	Total Seasonal Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date.	Average Seasonal Rainfall to Date.	Maximum Temperature for the Week.	Minimum Temperature for the Week.
Eureka	1 84	38 06	30 35	31 31	58	34
Red Bluff	96	21 52	11 43	19 25	72	38
Sacramento	30	14 30	14 70	14 72	66	43
San Francisco	1 63	19 40	13 52	18 07	66	44
Fresno	36	8 69	4 80	4 81	74	36
San Luis Obispo	1 32	18 45	14 61		76	36
Los Angeles	1 02	15 35	7 47	15 71	82	44
San Diego	26	9 58	5 68	8 17	76	46
Yuma	00	4 72	0 86	2 60	82	42

ANNUAL MEETING.—The Regular Annual Meeting of the stockholders of the Hale & Norcross Silver Mining Company will be held at the office of the Company, No. 421 Pine street, room 3, San Francisco, California, on WEDNESDAY, the 10th day of March, 1897, at the hour of 1 o'clock P. M. for the purpose of electing a Board of Directors to serve for the ensuing year, and the transaction of such other business as may come before the meeting. Transfer books will close on Saturday, March 6th, at the close of business hours.

R. U. COLLINS, Secretary.

Wanted:

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Assessment Notices.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9), of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 24th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

MINERAL HILL MINING AND SMELTING CO.—Location of principal place of business, San Francisco, California; location of works, Spenceville, Nevada County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 4th day of January, 1897, an assessment (No. 1) of five cents (5c) per share was levied upon the whole of the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 210 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of February, 1897, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 25th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. PEACH, Secretary.

Office—210 Sansome street, San Francisco, California. Office hours from 1 to 3 o'clock P. M.

POSTPONEMENT.

At a meeting of the Board of Directors of the Mineral Hill Mining and Smelting Company, held on the 15th day of February, 1897, it was resolved that any stock upon which the assessment shall remain unpaid on the 15th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on TUESDAY, the 13th day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

CHAS. PEACH, Secretary.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 13th day of January, 1897, an assessment (No. 6) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of February, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors the date of delinquency of the above assessment is postponed to the 10th day of March, 1897, and the day of sale to MONDAY, the 29th day of March, 1897.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

ANDES SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia City, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of February, 1897, an assessment (No. 43) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 20 and 22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of March, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 31st day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Rooms 20 and 22, Nevada block, 309 Montgomery street, San Francisco, California.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Silver Star Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 10th day of February, 1897, an assessment (No. 26) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 16th day of March, 1897, will be delinquent, and advertised for sale at public auction, and, unless payment is made before, will be sold on TUESDAY, the 6th day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

MARGUERITE GOLD MINING AND MILLING COMPANY. Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice.—There are delinquent upon the following described stock on account of assessment (No. 5) levied on the 14th day of January, 1897, the several amounts set opposite the names of the respective shareholders, as follows:

Name	No. Cert	No. Shares.	Amt
Julius Winkler	29	200	25 00
G. F. Deetken	82	1 000	100 00
Julius Winkler	95	400	50 00
Mrs. G. F. Deetken	100	600	60 00
Fred Deetken	255	1 000	100 00
Mrs. G. F. Deetken	256	800	80 00
Franz Schmitz	285	50	5 00
Franz Schmitz	286	50	5 00
Franz Schmitz	287	50	5 00
Franz Schmitz	288	50	5 00
Franz Schmitz	289	50	5 00
Franz Schmitz	290	50	5 00

And in accordance with law, and an order from the Board of Directors, made on the 11th day of January, 1897, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 237 Twelfth street, San Francisco, California, on THURSDAY, the 8th day of April, 1897, at the hour of 5:30 o'clock P. M. of said day, to pay said Delinquent Assessment thereon, together with costs of advertising and expenses of sale.

F. MeTTMANN, Secretary.

Office—237 Twelfth street, San Francisco, California.

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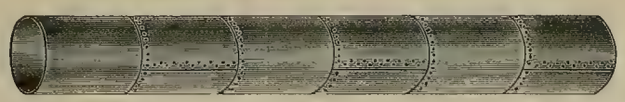
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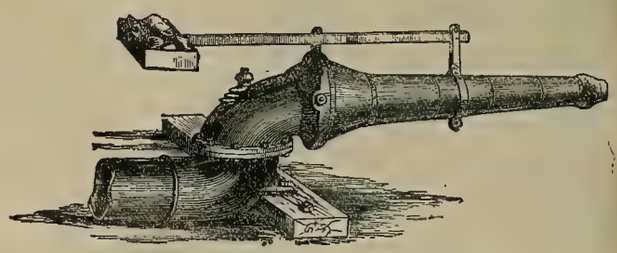
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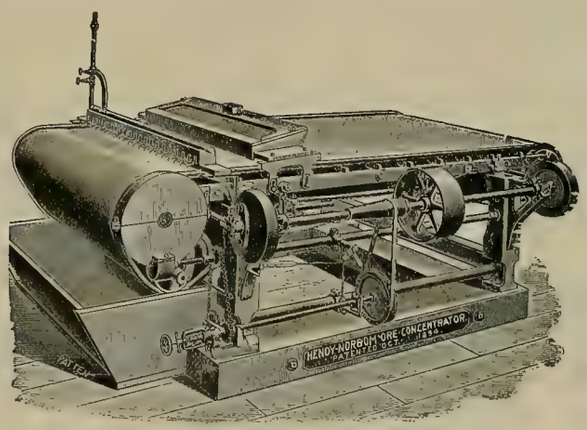
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Mr. John O. Norbom—DEAR SIR: I have been using your Concentrators at our mines in Brown's Valley and am pleased to inform you that they are in every respect thoroughly satisfactory. When erecting the plant at the above-named place we built Canvas plant, but since putting in your Concentrators we have but little use for that. The percentage of sulphurets now being handled is from 1¼ to 2 per cent, mostly galena and iron pyrites, and crushed fine. We save from the pulp over your machine 98⅛ per cent, and it hardly pays for the labor on the Canvas plant. The motion given your Vanner by its delicately constructed curved springs renders it a perfect machine, and in my estimation it is but a short time before it will replace all other machines of a like nature now in use.

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[Signed] F. W. PAGE,
General Manager Webb G. M. Co.

SAN FRANCISCO, CAL., Jan. 31, 1897.

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With ores carrying 3 to 4 per cent sulphurets, they will easily handle ten tons each per day and save over 95 per cent; but with a more heavily sulphuretted ore the quantity given them to work should be less.

With the improvements you have made in this machine since ours were bought, I should say that your Concentrator was almost perfect in capacity and in saving and wearing qualities.

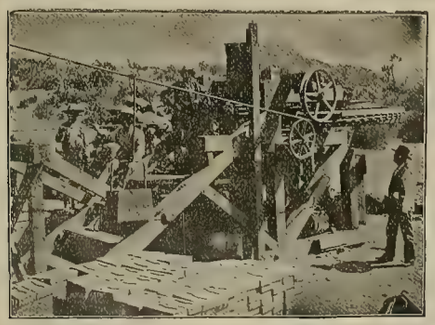
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[Signed] N. S. TROWBRIDGE,
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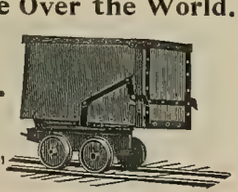
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No. 1914.—VOLUME LXXIV. Number 11. SAN FRANCISCO, SATURDAY, MARCH 13, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Cochrane Special Feed Water Heaters and Receivers.

Herewith are presented several views of one of the devices which have been designed and placed on the market for heating the feed water, and for use in connection with any heating system using exhaust steam. The first view shows the external appearance of the Cochrane special heater and receiver, built by the Harrison Safety Boiler Works, Germantown Junction, Philadelphia. The second view shows the general construction and location of the oil separator, overflow opening and its protecting hood, steam trap, float and connections to waste pipe, etc. Figs. 3 and 4 show the general construction. These heaters are constructed to withstand, if necessary, a working pressure of fifteen pounds per square inch, which is five or six times as much as the back pressure ordinarily carried to insure circulation in a heating system.



FIG. 1.

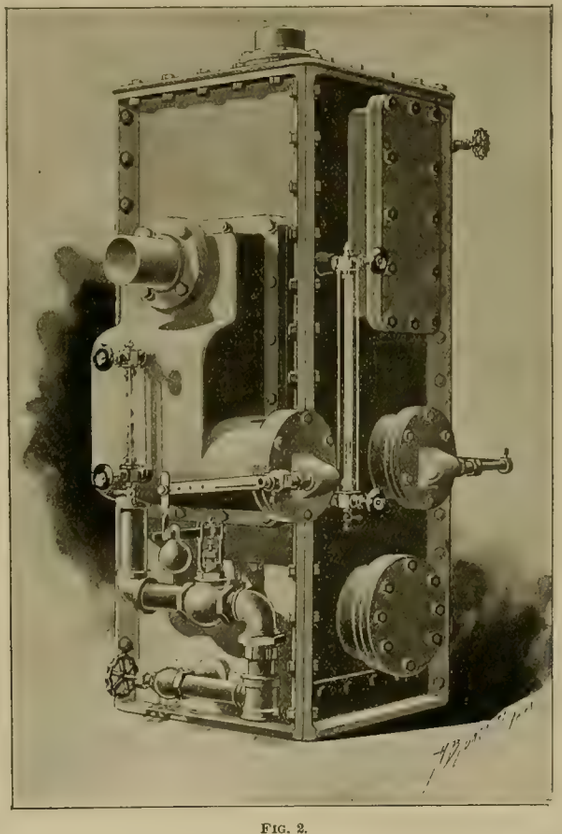


FIG. 2.

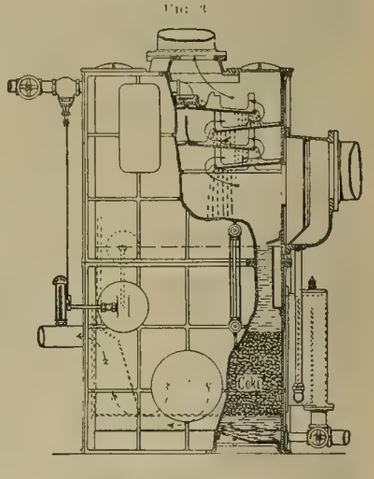


FIG. 3.

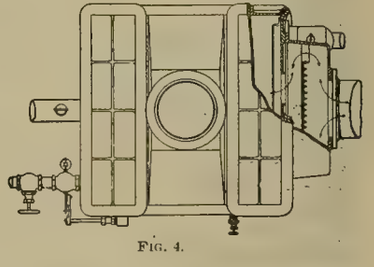


FIG. 4.

COCHRANE SPECIAL FEED WATER HEATERS AND RECEIVERS.

The system, in brief, is as follows: The different exhausts from pumps, engines, etc., are collected in one pipe and passed into the heater through the separator, which extracts all oil or grease. The boiler feed water is first taken care of, the cold water needed to supplement the return condensing the requisite amount of exhaust steam. The surplus exhaust then passes through the heating system and this, when condensed, is gathered and brought back into the heater in the firm of hot water; the exhaust being supplemented, when necessary, by live steam direct from the boiler through a reducing valve, which is so set that it will only admit steam when the pressure of the exhaust falls. The exhaust pipe to the atmosphere is provided with a back pressure valve set to any required pressure (usually less than three pounds), that the pressure may not exceed the desired amount.

The cold water is automatically regulated by a self-draining float, which, so long as the condensed steam furnishes the necessary water supply, allows no cold water to enter, thus obtaining the full benefit of all the heat in the exhaust, and using over and over again the comparatively pure water of condensation, which should furnish from 80 to 90 per cent of all the water used when the heating system is in operation. This means pure water for the boilers, less frequent cleaning, greater efficiency and greater longevity. In these heaters the cold water supply is brought in at the top and the quantity of this supply is controlled by a balanced valve operated by suitable connections to a ventilated copper float of long leverage. The temperature is given to the incoming water by breaking it up and thoroughly mingling it with the exhaust steam, which passes up between the trays and thence out of the top of the heater to the heating system. The exhaust steam in entering the heater first passes through the oil separator.

To prevent the egress of steam while providing an exit for the overflow, and for the oil and water taken out by the separator, a special steam trap, composed of another suitable long leverage ventilated copper float operating a balanced valve in the waste pipe, is provided. The illustration will explain the general detail of this arrangement.

The returns from the heating system are brought into a specially designed trough forming a water seal for the return pipe, thereby preventing steam from the heater from ascending into the heating system through the return pipe and interfering with the circulation, and at the same time providing for bringing this water of condensation into contact with exhaust steam in the heater, to insure for this water the same temperature as that of the water stored in the pool below. Another feature is the provision for both a working low water level and a high water line, in order that the heater may store up any sudden rush of the pure water of condensation returned from the system.

To provide additional depositing surface and filtering material, all of these heaters and receivers are furnished with perforated cast iron plates or shelving, on which filtering material, such as coke, hay, gravel, etc., can be used. Suitable doors for the introduction and removal of the filtering material are furnished, together with hand hole and tray cleaning doors, all conveniently placed and so arranged that easy access is offered to all parts of the heater.

The Parke & Lacy Co, 21 and 23 Fremont street, San Francisco, who are the coast agents for this heater and receiver, furnish a detailed list of twenty-two sales in October and November, '96. In one case—the Baltimore & Catonsville Construction Co.—sixteen competitors bid on an advertised contract for 6000 H. P. for use in the steam plants of the electric road running between Baltimore and Washington, and after thorough investigation the contract was given the "Cochrane."

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J. F. HALLORAN.....General Manager

San Francisco, March 13, 1897.

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Mud Roads to the Mines.

Since the publication of the last issue of this paper a number of communications have been received in reference to the wretched state of the roads in the mining counties along the Sierras. One correspondent writes that on the road from Ione to Sutter Creek, in Amador county, he saw eight freight wagons stuck in the mud and left to await better weather and an improvement in the condition of the roads. Besides that, there were four dead mules. Many people, in preference to driving over the roads or taking the stage, walk across the country, avoiding the highways. Many of the mines which ship out concentrates to the smelters are compelled to store them until spring. But little calculation would be required to show that the losses entailed to the owners of working mines, to those who are fitting up new properties, to the storekeepers and to the working miners who are thrown out of employment for the time, during this one season, is enough to more than pay for first-class highways.

Under the old laws there has been little excuse for bringing about such a condition, and it is questionable if much good will be done under the new Highways Act unless the people are more careful in the choice of officers. However, all interests are sufficiently awakened to the need of a change, and their influence should be felt.

Non-Residents and Mining Degrees.

At the last convention of the California Miners' Association C. McM. Ross made a suggestion that arrangements be made so that the University of California issue to non-resident students the degree of Mining Engineer, that the University announce the subjects in which students would be examined and suggest the best text-books for study, and in all possible ways aid the non-resident students to prepare for such examinations as would be required.

As to the first part of the suggestion made by Mr. Ross—that the University issue to non-residents the degree of Mining Engineer—there is no doubt that upon passing the proper examinations any non-resident would obtain such a degree. However, without better facilities than can now be obtained in the mining districts and without the aid and general direction of the faculty of the College of Mines, very few would be able to prepare themselves. For this reason the suggestion made by Mr. Ross is of value and should be acted upon, if a feasible plan can be devised. It is well known that a large proportion of the students in the College of Mines are miners who have gone to Berkeley to obtain better knowledge of the sciences upon which a thorough mining education is based. Much of the work, no doubt, they might do at the mines in certain districts with very little assistance from the University. However, to obtain the degree of Bachelor of Science or Mining Engineer they would all doubtless have to spend some time in the laboratories at Berkeley.

Mine Robberies.

As to this evil, the act of March 20, 1872, provides that anyone stealing from any mining claim, tunnel, sluice, undercurrent, riffle box or sulphuret machine any gold dust, amalgam, quicksilver or concentrates shall be deemed guilty of grand larceny. This has long been found inadequate, and the Legislature has passed a bill introduced by Assemblyman Powers of Placer amending the act so as to read as follows, the words in italics being new: Every person who shall feloniously steal, take, conceal, remove or carry away from any *mine or* mining claim, tunnel, sluice, undercurrent, riffle box, sulphuret machine, *quartz mill, arrastra mill, chlorination or reduction works*, any gold dust, *or nuggets, or specimen rock*, amalgam, quicksilver, or concentrates, *or zinc sponge, or the ore or mineral from any mine, ledge, lode, vein or deposit, or other valuable mineral products* the property of another, shall be deemed guilty of grand larceny, and upon conviction thereof shall be punished by imprisonment in the State prison for any term not less than one year or more than fourteen years.

A number of leading members of the California Miners' Association a few months ago asked that steps be taken to induce the Legislature to pass an act to provide that all people who bought ore, sulphurets or bullion should keep a book, in which should be recorded the names of those from whom they purchased, the mine from which it was secured and other such data as would identify it, and to provide, further, that any one making affidavit that ore or bullion had been stolen from him should have a right to inspect such books. Such a law is in force in Colorado and works well. In this State those who steal from the mines can with little difficulty dispose of bullion to storekeepers or saloonkeepers in the neighborhood with little fear of detection from that source. Mine owners often complain that from those who purchase they seldom find any records of the purchase. Yet they say that in most of the cases where such stolen property is traced, it is through the larger concerns who do keep records. However, no steps were taken to have such a bill introduced by those most interested.

Mining Corporations' Power to Purchase Property.

Assembly bill No. 454, an act to amend the act of April 23, 1880, for the further protection of stockholders in mining companies, has passed the Legislature and been signed by the Governor. Such a bill was recommended by the last convention of the California Miners' Association. It is as follows:

It shall not be lawful for the directors of any mining corporation to sell, lease, mortgage, or otherwise dispose of the whole or any part of the mining ground owned or held by such corporation, nor to purchase or obtain in any way (except by location) any additional mining ground, unless such act be ratified by the holders of at least a majority stock of such corporation then outstanding. Such ratification may be made either in writing, signed and acknowledged by such stockholders, or by resolution, duly passed at any regularly called stockholders' meeting. The certificate of the secretary of any mining corporation reciting such ratification at a stockholders' meeting, or the names of stockholders with the amount of stock held by each, and the total stock outstanding signed and acknowledged by him in the manner provided for acknowledgments to conveyances of real property, may be attached to or indorsed upon any deed, mortgage, conveyance, or other instrument made under this act and recorded with such deed, conveyance or other instrument, and the recitals contained in such certificate, or the duly recorded copy thereof, are made prima facie evidence of their truthfulness for all purposes whatsoever; *provided*, that no one except a stockholder in any such corporation shall be permitted to urge any objection to the acquisition of any additional ground or other property by such corporation.

For the Prospectors' Protection.

A mining lawyer commenting on the pending mining legislation at Olympia, Wash., according to a paper published in that State, brings up the following unique arguments against a meritorious bill:

The bill before the Legislature providing for ten feet of work to be done on a mining claim before a mineral discovery can be established may be wise legislation, but it will not fill the bill. When a prospector makes or locates a discovery, he is very apt to know whether or not it is worth his while to sink on the property. One thing certain, it is his by right of discovery under the United States statutes, and the State has no business interfering with him to the end of making his privilege an expensive luxury. Prospecting is a trade within itself, and involves the element of discovery only, while mining is quite another occupation, and it is hardly the proper thing for the State to force the prospector to work or the miner to prospect.

The average genuine prospector will probably object to this description of him, even where he is given credit for knowing whether a mine will pay to sink on or not simply by looking at it. Of course, most prospectors know that many a good claim has been spoiled by sinking on it, and some of them know when to stop sinking for fear of injuring their prospects. However, the real prospector knows very well that to be compelled to sink ten feet or run a tunnel that distance before completing a location can work him little harm, and in a way is a protection to him. One of the greatest evils the prospector or any one locating a mine has to contend with is from those harpies who, upon the discovery of a promising claim, make locations all about with the idea that these may become of value through the work of the first locator or for the purpose of levying blackmail by cutting off rights of way. Not being compelled to do any work, they simply hold their claims, and, if necessary, when the time for doing the required assessment work has passed, relocate. Often these worthies work in pairs or in groups, and at the time for relocation jump each other's claims. Such a bill can work no hardship upon the man who honestly locates a mine.

Had all locators been compelled to comply with the spirit of the laws as they now stand, many more mines would have been developed. The object of them is to encourage the mining industry and not to hamper it. It is claimed that the passage of the proposed bill would be in conflict with the United States statutes, but such is not the case. Similar laws have been tried in other States and not overthrown by the courts.

Reports of Mining Corporations.

Last week mention was made of the passage by the Legislature of California of a bill to amend the act of March 30, 1874, for the better protection of stockholders in mining corporations. It would appear that the passage of this bill in the shape it was signed by the Governor is more far reaching than was indicated by the copy sent to the MINING AND SCIENTIFIC PRESS. The bill as originally introduced by the Committee on Mines and Mining in the Assembly was made to refer to all mining corporations. But before its final passage there were added to the first section, which provides for the making of monthly reports by superintendents and keeping of accounts for the inspection of stockholders, the following words: "Provided that this section shall apply only to mining corporations whose stock is listed and offered for sale at public exchange, and shall not apply to mining corporations whose stock is not listed in the public exchange, and is not offered for public sale."

If the act stands, its effect will be that the superintendents of mining companies shall no longer be required to make weekly or monthly statements, nor the secretaries compelled to keep their accounts open to inspection of shareholders, excepting, of course, companies listed on exchanges. This is as desired by and in accordance with a resolution of the California Miners' Association passed at its last convention, in which the repeal of the act of March 30, 1874, was urged.

However, the bill would seem to have been loosely drawn. It has been suggested to us that the words quoted above will be construed as making the bill special legislation and unconstitutional.

Concentrates.

AN experimental plant for testing ores is being erected for Charles Butters in Salt Lake City.

A NEW YORK syndicate has purchased the California mine in the Slocan district, British Columbia, for $60,000.

RIGHTS of way are being obtained for the proposed railroad from Oakdale, Stanislaus county, to Sonora, Tuolumne county.

THE Provincial Legislature of British Columbia has passed a bill that will enable Rossland, Nelson and Grand Forks to incorporate.

THE Young America, adjoining the Dexter mine, at Tuscarora, Nevada, has been bonded to A. B. Andrews of Salt Lake for $20,000.

THE Mercur mine in Utah has ordered a rock crusher with a capacity of 1000 tons daily, and will begin the enlargement of the mill.

THE owners of the Centennial-Eureka mine at Tintic, Utah, contemplate erecting a mill, to work low-grade ores, with a capacity of 200 tons a day.

TO DATE 294 applications for permits to work hydraulic mines have been made to the California Debris Commission; of which 231 have been granted.

THE Mount Morgan Gold Mining Company of Queensland crushed, in 1896, 104,265 tons of ore, from which the gold returned amounted to 151,137 ounces.

TESTS are being made in Butte, Montana, of a smokeless powder, which it is claimed will not explode from concussion, and when ignited makes no smoke or fumes.

AN amendment to the mining laws of British Columbia, to provide that no Chinese shall be employed in quartz mines, is being advocated in the Provincial Legislature.

THE Mitchell's Creek Freehold Gold Estate of New South Wales crushed last year 11,240 tons of ore, from which there was obtained in gold £264,504, an average of over $110 per ton.

THE first hoisting engine in the Rand district, in Kern county, California, has just been erected on the King Solomon mine, on which it is the intention of the owners to sink 500 feet.

THERE is considerable stir over some new placer discoveries in Tule canyon, Esmeralda county, Nevada, where placer claims are being staked off on ground covered by 4 or 5 feet of snow.

THE railroad from Nampa to the Owyhee mines in Idaho, which is being built by local capital, has been completed to the Snake river, where a bridge is to be built at an expense of $70,000.

ACCORDING to a Mariposa county paper Capt. A. H. Ward has disposed of his Pinon Blanco mining property to a company of Colorado mining men known as the Iron Mountain Mining Company of Colorado.

THERE is an eager seeking after British Columbia mines on the part of English capitalists. Offers have been made for the War Eagle, lately purchased by a Montreal syndicate, for the Le Roi and for the Jumbo.

THE Jackson Exploration Company in January in 29¼ days sunk the main shaft in the Amador Queen No. 1, in Amador county, California, 77½ feet, making a total to that date of 472 feet. Ten men were employed.

THE Alice mine in Pinacate district, Riverside county, Cal., has been bonded to Los Angeles people for one year. A cyanide plant of about twenty-five tons daily capacity will be put up and the ores treated by that process.

A CONTRACT has been let for building 102 miles of railway from Weiser to Seven Devils, Idaho. It is expected to begin work this month. The building of this road is caused by the need for transportation of ore from the mines.

THE Revelstoke, British Columbia, Board of Trade has recommended the appointment of a Government inspector in each district to report upon the condition of each mine, so as to afford investors an opportunity to obtain actual facts.

DR. WILLIS E. EVERETTE, the mining editor of the Washington *Investor*, states that he and associates have been authorized by a syndicate of foreign and New York capitalists to offer $5,000,000 for the Le Roi mine at Rossland, B. C.

AT Los Angeles the price of oil is steadily going up, sales having been made at as high a price as $1.50 at the wells. The City Council has taken up the question of regulating the work of production, to abate nuisances within the city limits.

WHAT is claimed to be a valuable discovery of coal has been made near White Horse district, Washoe county, Nevada. The layer found at a depth of 32 feet below the surface is said to show a body 4 feet thick of coal of excellent quality.

THE manager of the Harquahala mine in Arizona reports for January: 3663 tons of tailings—Bullion yielded, $7054; royalty on lessees' ore and miscellaneous, $3150; total, $10,204. Milling and cyaniding expenses, $5366; profit for month, $4838.

IN order to better handle the output, the Everett & Monte Cristo Railroad Company in Washington has decided to build a branch extending from the main line at Granite Falls some thirty miles into the Sultan and Silverton mining districts.

A BILL has been introduced in the Legislature of New Mexico to prevent mine owners from compelling their employes to purchase their supplies from the mine stores—a custom that is very general in that Territory among the larger companies.

UP to Feb. 28 there were shipped from the Kootenay mines this year 9547⅛ tons of ore of an average value of $77.10, or a total value of $736,096. Besides this, matte from the smelters valued at $661,079 was shipped. This gives a total for the two months of $1,397,175.

THE railroads in the Kootenay country in British Columbia are increasing their rolling stock to meet the demands on them, and the hotels are overcrowded. The newspapers warn all except miners or men with money to stay away, as there is no employment for others.

ARRANGEMENTS are being made for the erection of a 200-ton matte smelter at Canon City, Colorado, by a company represented by ex-Governor Foster of Ohio and other parties. The plant is intended to reduce the Cripple Creek ores from 20 to 25 tons to 1, and sell the matte to the refineries.

IN Montana the Mineral Land Commissioners have in the Bozeman district classified 1,656,134 acres of railroad lands out of the total of 2,313,164 acres. The cost to the Government will not exceed 7 mills per acre. Only four protests have been filed against the classifications as made.

AT the Le Roi mine, British Columbia, a test was made of ten tons of ore that assayed $10 per ton, or what is is called in that camp low grade, and it showed that $7.50 per ton was free and could be saved on the plates. This, it is understood, will lead to the erection of stamp mills on the ground.

THE London and Cripple Creek Reduction Corporation is the name of the company which has about completed reduction works at Florence, Col. The new plant, the manager states, will have a capacity for treating 200 tons of ore per day by the Page leaching process, designed to work low-grade refactory ores.

THE Union Pacific Railroad Co.'s coal mine No. 1 at Rock Springs, Wyoming, has produced, since it was opened in 1869, over 5,000,000 tons of coal. To bring coal to the surface the company operates a 2000-horse power engine having two reels, each of which carries a steel rope 1¼ inches in diameter and over a mile long.

COLONEL C. F. CROCKER, of the Southern Pacific Company, states that they have made surveys and have everything in readiness to begin building a road from Mojave to Randsburg, California, but are awaiting until satisfied that the developments of the camp will warrant this. A road could be built in a few weeks.

MANY records for fast sinking of shafts are being published of late. At the Amador Queen mine in Amador county, Cal., lately 85 feet were sunk in thirty days. At the W. Y. O. D. mine at Nevada City, Cal., a shaft 6x10 was sunk last month 150 feet in thirty days through solid blasting in granite, diorite and diabase.

THERE has been organized a Mining Bureau by people of Denver, Colorado, which will keep exhibits of ores from all districts and reports of mines and districts, which may be consulted. In addition, on Saturday afternoons meetings are held, at which addresses are made by authorities on different subjects connected with mining.

SEVERAL good records have of late been made in California in shaft sinking, but none so far equal some of those of the Comstock. In 1878 the Osbinton shaft was sunk from the surface 2000 feet in five months—an average of nearly 14 feet per day. The dimensions were 30x8. The Forman shaft was sunk 2000 feet at the rate of 15 feet per day.

IN proportion to the amount of money spent and lives lost in Rhodesia and the stir it has made in the world during the past year or two, the gold output of the mines has been ridiculously small. According to the *Rhodesian Times*, published at Salisbury, the total number of tons mined since 1890 is only about 10,000 and the gold obtained 7047 ounces.

IN Cripple Creek more low-grade ores are being treated this year than ever before. The building of new reduction plants has brought down the cost, and lower grades are being treated than has heretofore been possible. Much of the ore of this class is being held as an investment, the owners believing that treatment costs will be still further reduced.

DURING the week ending February 27 twenty-four cars loaded with silver and lead bullion were hauled out of Salt Lake City, Utah, by the Union Pacific, the weight reaching 834,049 pounds. In addition to this there were three cars of copper bullion, weighing 142,539 pounds, and fifty-one cars of gold, silver and lead ore, weighing 1,997,200 pounds.

AT La Brilladora mine, at La Brilladora, Mexico, owned by New York people since 1892, the hoisting plant consists of natives, each with a rawhide bag and a notched pole. They strap the bags to their heads and carry out from 200 to 300 pounds each trip. One man will make twenty-five trips each day to a depth of 200 feet. His wage is 37½ cents per day.

THE Utah Legislature has before it a mining bill providing that locators shall put monuments at each corner of a claim, and that within ninety days from the date of the location notice annual assessment work to the value of $100 must be done. It will not be many years, it is to be hoped, before California will fall into line and pass laws containing these reasonable provisions.

THE Horn Silver mine, Utah, in 1896 put through the mill 26,684 tons and marketed 5534 tons. The yield was $213,543. The cost of extracting the ore was $4.51 per ton, the cost of concentration, including labor and supplies, $1.52, each ton of concentrates representing a cost of $7.63. The average value of the concentrates was $26.88, while the average value of the shipping ore was $12.93 per ton.

THE *Mining Investor* of Colorado Springs, which is a conservative and yet a bright paper, says that it believes $10,000,000 would be a conservative estimate of the output of Cripple Creek for 1897 and would not be at all surprised to see it foot up $12,000,000. It may be, it says, that litigation will interfere, but nothing outside of this can interfere with the increasing prosperity of the camp.

STATE SENATOR NEBEKER of Utah is advocating the passage of a law to regulate the number of claims a single individual may locate. He says that two partners confessed to having located no less than 458 claims in the Camp Flag district. Today the annual assessment work on them would call for an annual outlay of $45,800. Over 100 claims have been located in the interest of one person in the West Dip at Mercur and another controls 163.

WORD comes from Tintic, Utah, that in the Sioux-Ajax tunnel the mineral-bearing zone has been reached. The ultimate destination of the big tunnel is a point at which connection will be made with the ore bodies of the Sioux mine, in which thousands of tons of ore have been blocked out. It was to provide an economical outlet for these bodies that the tunnel was incepted, but in tapping these it became necessary to cut through ground that must share the benefit.

THERE is hard feeling between the "sooners" and the government officials on the borders of the Colville reservation in Washington. Along the Columbia river, from Hunter to Daisy, there are said to be from 300 to 500 men waiting for the signal which will open the reservation to the prospector. The seekers for locations declare that when the north half of the reservation was opened last year the government officials held the civilians at bay and took up the best ground.

AT the time of the great fire in the Utica mine at Angels, Cal., all the rats in the mine were killed or driven out. Lately the superintendent ordered of his hardware merchant in San Francisco a gross of rats to be sent up. This has been done and the rats turned loose in the mine, where they are said to serve as a protection to the miners. In case of fire, water or gases the movements of the rats warn the miners of the approach of danger. They also prove useful in clearing up the refuse of the mines.

A MOVEMENT is on foot in London among certain shareholders in mining companies to form an association for the purpose of protecting their interests. One of the promoters says: "The discovery of gold in Western Australia and the cheapening of the mode of extraction of the precious metal have led to the formation of an enormous number of mining companies. It is notorious that many of these companies are not managed in the interest of the shareholders at all, but solely with a view to put money into the pockets of the directors and their friends."

THE San Francisco Copper Company, operating copper mines in Lower California, has disposed of its holdings to a London and Paris financial combination for a consideration of $500,000, and the stock is soon to be placed on the Paris bourse. The mine is an old producer and the output up to the present time is claimed to be in excess of $1,000,000. It was formerly worked by the Mexicans in the crude fashion of the miners of that country, and for several years past has been operated by an American company.

LAST week the cash in the New York clearing house banks was a little over $200,000,000, an amount that has not been exceeded since 1894. Of this sum $60,000,000 is seeking investment. There is likely to be more. The gold mines of the United States produced over $50,000,000 in 1896, and probably not much less than $100,000,000 was paid to American owners of mines in purchasing properties by foreigners. It is probable that much more will come in this year, and much of this money will seek investments other than mining.

THE Wyoming Legislature has passed an act by which fees for filing incorporation articles are regulated by the amount of capital stock. There is a similar law in Montana, which is easily evaded. In other States it has been proposed to adopt like measures. Luxuries, especially harmful luxuries, have long been considered fit objects for high taxation. If any one wants to incorporate a 10-foot shaft with a 2-foot vein for $1,000,000, he should pay for the use of the facilities given by the State. An act on this subject might be entitled "An act to levy a tax on deception."

THE coming "boom" in mining in London promises to be as to British Columbia properties. Africa and Australia cannot be conjured with, and the most available field seems to be British Columbia. More of the money that is seeking legitimate investment will come to the United States than ever before, but probably, happily, without any "boom." British Columbia is a splendid field for investment, and those papers which care most for the welfare of the Province are doing all they can to prevent overcapitalization of mines and to keep up the good reputation of the properties and people of the Kootenay country.

THE day after the closing down of the De Lamar mine in Lincoln Co., Nevada, March 1st, on account of the formation of a miners' union and the belief on the part of Captain De-Lamar that a strike would ensue, a meeting of the old employes was held at which resolutions were adopted by the employes of the De Lamar Company stating that they were satisfied with the treatment and wages they had been receiving, and had not contemplated a strike and were duly appreciative of the situation. The Salt Lake *Tribune* states that this does away with all misunderstandings and that the company will soon resume work.

THE Carson *Appeal* makes an attack on Assembly bill No. 74, introduced in the Nevada Legislature, providing for an extra tax on the product of the mines, saying that it is a scheme on the part of some script dealers in San Francisco to realize a profit out of the bonds of Lincoln county. In 1873 Lincoln county issued bonds to the extent of $180,000, bearing 10 per cent interest per annum. The interest and principal now amount to $600,000. In 1895 no interest had been paid on the part of the principal. For ten years prior to 1895 the commissioners of Lincoln county failed to levy any tax to meet the payment of these bonds, and the holders sued the county in the U. S. Court and obtained judgment for $600,000. This bill, if passed, would impose most of the burden on the De Lamar mine if it should start up again.

THE miners of the Rand district, in Kern county, California, are evidently not satisfied with the laws being passed by the Legislature, for the amended laws and regulations adopted last week provided for a definite marking of the boundaries of all claims. The proposed bill, which is now in the hands of the Governor, leaves this point in as unsatisfactory a shape as it has been. The section of the Rand regulations on this subject is as follows: "Section 4. The area of a mining claim in the Rand mining district shall be as now by the United States mining laws provided, not to exceed 1500 feet in length, with 300 feet on each side of the vein or lode, and such surface boundaries shall be marked by five monuments, one at each corner, with an initial monument at the point of discovery, each monument to be not less than 2½ feet high, with a notice placed thereon, showing the designated corner of the claim, with relation to the same."

REGARDING the foreign market Messrs. Pierre Humbert Jr. & Co. say: "The talk of another large foreign investment of capital in our copper mines may or may not be true at present, but it is certain that over three years ago letters were received from a very prominent London banking house, desiring to know if Calumet & Hecla and Boston & Montana could be acquired for that market. Since that time the Anaconda mine has been placed there, and has whetted the appetite of foreigners for our copper mines. It would not be astonishing if a London absorption of shares from the Boston market itself would not soon develop. The demand for good gold mining properties increases, and there is considerable activity in the placement of new properties. Another $2,000,000 syndicate is being organized to operate in mother lode gold properties. The tendency of the Boston market is distinctly toward mining properties of copper and gold."

THE annual report of the Quincy, Mich., Mining Company for 1896 shows a production for the year of 16,863,477 pounds of refined copper, as compared with 16,304,721 pounds produced in 1895, an increase of 568,756 pounds. The gross sum realized for the copper was $1,842,117.19, and from sales of silver $22,080.42. This is equivalent to 10.92 cents per pound for the copper alone, or, taking copper and silver together, 11.05 cents per pound on the output. Expenses at mine, smelting, transportation and all other expenses amounted to $1,108,569.14, making the cost of copper 6.57 cents per pound. Mining and other profits from all sources were $770,063.64. Dividends paid by the company in 1896 amounted to $1,000,000. Two of the Quincy's shafts are now down a depth of over 4000 feet and another 3920 feet. Since the organization of the company the Quincy mine has produced a total of 199,388,521 pounds of refined copper at a profit of $9,597,564.32, from which fifty-six dividends, amounting to a total of $8,670,000, have been paid. The shares of the company are to be doubled shortly, making them 100,000.

The Precipitation of Gold by Zinc Thread from Dilute and Foul Cyanide Solutions.*

By ALFRED JAMES, Glasgow, Scotland.

Some months since, in the Johannesburg gold fields of South Africa, the attention of the author was directed to certain statements to the effect that the gold contents of foul or extremely dilute cyanide solutions could not be effectively precipitated in practice by the usual zinc method.

Such statements caused all the greater surprise because it is well known that this difficulty is not encountered in other well-known districts, as, for example, in New Zealand, where solutions containing less than 0.05 per cent of CKy are regularly reduced in practice to below 1 grain of gold per ton, while in Mexico and the United States almost equally satisfactory precipitations are not uncommon.

As a result of these representations, however, the author visited several plants at work in the Transvaal, and noted that while at some few mines the precipitation was really excellent, at other the effluent, after treatment, was much too high in bullion contents.

An investigation into the causes of these unsatisfactory results disclosed the fact that more attention to the close packing of the zinc shavings in the extractor compartments tended to improve the results, even with the most dilute solutions. The function of the zinc being one of surface, it stands to reason that a compartment well filled with zinc would be more effective than a half-filled one. Moreover, the quality of the zinc was inferior. This should be in long, tough, thin, light threads, light enough to ignite readily, and tough enough not to disintegrate easily into a slime. The coarse shavings too frequently employed appear to give the reverse of the best practice; they are brittle, contain less surface, and take up more room. It is almost impossible to pack a compartment properly with such zinc, which permits the existence of channels through which the solution may ascend without coming into effective contact with the zinc at all.

The boxes which do the best work have compartments the depth of which is greater than any other dimension.

But even under the best conditions solutions are encountered which give trouble when run through in the ordinary way. Such solutions are those charged with alumina salts, and those resulting from the treatment of weathered concentrates containing acid iron salts.

Very thorough investigation has been carried out on these solutions; and it is found that by simply giving them longer contact with the zinc they may be treated with complete success. With solutions the alkalinity of which has been neutralized by acid salts, it is advisable to add a slight amount of soda; but even in the most difficult case an alkalinity of 0.025 per cent, or ½ pound per ton, has been found perfectly effective.

Moreover, with extremely dilute cyanide solutions, that is, solutions containing under 0.05 per cent of free cyanide, perfectly satisfactory precipitation may be carried out by passing the solution through the extractors at the rate of 1 ton of solution per twenty-four hours for each cubic foot of zinc thread employed. But even when the solutions are very foul, with iron and alumina salts in solution, and containing *no free cyanide*, one is able in practice to reduce the bullion contents to *1 or 2 grains per ton* by passing the solution through the extractors at the rate of about ½ ton of solution per cubic foot per diem, the solution being in contact with the zinc for one and one-half to two hours.

This small amount of extractor space, even with the most difficult solutions, as compared with that required for electric precipitation, deserves to be noted.

Liquors derived from the treatment of cupriferous ores and concentrates, and containing 0.2 per cent of copper in solution, were found to be quite amenable to a treatment similar to that which sufficed for the foul liquors from weathered concentrates.

The following are notes of experiments carried out in connection with the investigation above referred to.

The solution examined was one that was returned in a cyanide works as containing 44 grains of gold per ton, after it had been *twice* passed through the extractors in the usual manner. An investigation showed that it contained a considerable quantity of arsenic and nearly 1 per cent of soluble sulphates in solution, resulting from the treatment of some exceedingly acid weathered concentrates.

The solution was run through the extractors with the following modifications:

(*a*) The solution was run through a third time at the rate of 2 tons per cubic foot of zinc per diem.
Assay before treatment, 2 dwts. 12 grs. per ton.
Assay after treatment, 1 dwt. 18 grs. per ton.

(*b*) There were added 4 lbs. of ammonium chloride per ton of solution, and it was run through at 2 tons per cubic foot per diem.
Assay before treatment, 2 dwts. 12 grs. per ton.
Assay after treatment, 1 dwt. 17 grs. per ton.

The addition of the above amount of ammonium chloride had thus no beneficial effect at the above rate of extraction.

(*c*) There were added per ton of solution 4 lbs. of burnt lime, slaked and made into a cream, and the precipitate was allowed to settle. The rate of flow was not accurately determined, owing to the precipitate having reduced the rate of flow in pipe.
Assay before treatment, 2 dwts. 12 grs.
Assay after treatment, 14 grs.

(*d*) Solution (*a*) was run through again, for a *fourth* time, at 2 tons per cubic foot per diem.
Assay before treatment, 1 dwt. 18 grs.
Assay after treatment, 5 grs.

(*e*) The solution was run through again at especially slow rate of ⅓ ton per cubic foot per diem.
Assay before treatment, 1 dwt. 11 grs.
Assay after treatment, 2 grs.

This shows a great improvement, and indicates that slow running is, of itself, more practically efficacious and cheaper than the addition of chemicals to assist precipitation.

It was found, however, that after the run had been continued for some hours the assay of the effluent rose to 12 and then to 20 grains per ton. An examination of the zinc showed that it had been coated with a white incrustation which consisted mainly of ferrocyanide of zinc.

In all the above experiments there was only a trace of free cyanide or of alkali present in solution; and the formation of the incrustation pointed to the necessity of alkali or free cyanide in solution to prevent any such reaction.

(*f*) Some of the same solution as that used for the previous experiment was now run through the extractor at the rate of about ⅛ ton per cubic foot of zinc per diem, after sufficient cyanide had been added to the solution to make it show 0.08 per cent of free KCy.
Assay before treatment, 0 dwt. 19 grs. gold per ton.
Assay after treatment, 0 dwt. 2 grs. gold per ton.
KCy before treatment, 0.08 per cent.
KCy after treatment, 0.023 per cent.

This experiment shows that the addition of free cyanide causes a satisfactory precipitation. There was no incrustation formed on the zinc. The consumption of cyanide, however, amounted to 1 pound per ton; and to avoid this, if possible, the investigation was continued, and

(*g*) A similar experiment was carried out at the same rate of flow, but adding 4 lbs. of slaked lime per ton of solution instead of cyanide, the precipitated sludge being allowed to settle.
Assay before treatment, 0 dwt. 19 grs.
Assay after treatment, 5 grs.
KCy before treatment, *nil.*
KCy after treatment, *nil.*

The zinc was washed free from incrustation in dilute solution of caustic soda prior to the commencement of this experiment, and sufficient new zinc was added to replace the consumption of previous runs. At the conclusion of the experiment there was a slight incrustation on the zinc in the first compartment only.

(*h*) Experiment as above, but with 4 lbs. of caustic soda per ton added in place of lime. No fresh zinc was added, nor was the zinc washed.
Assay of solution before treatment, 0 dwt. 19 grs.
Assay of solution after treatment, 0 dwt. 1 gr.

After the run the zinc was very black, and there was no incrustation.

(*i*) Experiment as above, but with less soda, and the rate of flow increased to ½ ton per cubic foot per diem.
Assay of solution before treatment, 0 dwt. 19 grs.
Assay of solution after treatment, 0 dwt. 3 grs.

(*k*) In this experiment the run was continued for some days at ½ ton per cubic foot per diem, and samples were taken every twelve hours. There was no caustic soda added, there being present only 1-5 lb. per ton of solution; gold was added to make the solution up to 2 dwts. per ton.
The solution assayed before treatment, 2 dwts, 0 gr.
The solution assayed after treatment, 0 dwt. 2 grs. to 0 dwt. 5 grs.

The above experiments show the perfect practicability of precipitation from troublesome solutions by keeping the rate of flow at ⅓ to ½ ton per cubic foot per diem, with the presence of from 0.01 to 0.15 per cent of caustic soda.

A further test was made on the precipitation of auriferous solution carrying quantities of copper, with the following results:

(*l*) Used solution from the sumps, containing 0.2 per cent of copper in solution; was run through extractors at the rate of ⅛ ton per cubic foot zinc space per day. Half a pound of caustic soda was added per ton of solution.
Gold in solution before treatment, 2 dwts. 0 gr.
Gold in solution after treatment, 0 dwt. 0.8 gr.
Copper in solution before treatment, 0.12 per cent.
Copper in solution after treatment, 0.097 per cent.

The zinc was coated with metallic copper, but the precipitation at above rate of flow was practically perfect.

Two more prolonged trials were then undertaken, in which a large quantity of solution was run over the zinc used in *l*, without any addition of fresh zinc, for over a week, to note the effect of the metallic copper coating on the zinc. It was found that the coating became disintegrated in the upper compartment, and that the precipitation continued unimpaired, though, as the quantity of zinc in the extractors was gradually lessened, the effluent solutions rose in value proportionately. On replacing, however, with fresh zinc the zinc consumed, the solution again became practically gold free, as in *l*.

In connection with the above precipitation experiments, two other points call for especial remark:

1. The amount of alkali added is kept as low as possible, to avoid any great excess beyond the amount required to neutralize the acidity of the ore and for zinc box reactions.

2. It is well known that the presence of alkali or alkaline carbonates, always present in used solutions, interferes with the silver nitrate test, making the solution appear to be stronger in available cyanide than is really the case. Chemists in charge of works should, therefore, be careful not to be misled by this test, or lowered extractions may result. The effect of caustic potash or soda on double cyanide of zinc and potassium is *not* to regenerate all the cyanide of potassium as shown by silver test, the test, as suggested by C. J. Ellis, being rendered unreliable by the silver throwing out the zinc from the double cyanide, and the zinc so displaced being displaced by the KHO present, thus prolonging the titration.

$$K_2Zny_4 + 2AgNO_3 + 4KHO = 2KAgCy_2 + K_2ZnO_2 + 2KNO_3 + 2H_2O.$$

*Trans. Am. Ins. M. E., Chicago meeting, February, 1897.

New Zealand Gravel Dredgers.

Dredging, like everything else connected with mining, offers room for numerous improvements. The evolution of the dredge itself from the mere rawhide scoop, worked by hand, to the great steam bucket dredge, which lifts its hundred tons of wash per hour, shows what advances have been made in capacity, but other improvements have been made almost more important than increased capacity. Increased length of ladder now allows the buckets to bring up stuff from a depth of 50 feet, and I suppose this is by no means the limit of deep working. The tailings elevator is another important feature, for it overcomes a difficulty which threatened the very life of deep working. It will be easily seen that a dredge excavating to a depth of even 30 feet or 40 feet in the gravels of a river bed must make a very big hole. In the loose shingle the sides would naturally fall in until what is known as a sufficient batter was made, and frequently the hole excavated was larger than the whole length of the dredge. This meant until recently that the enormous amount of tailings sent over the stern of the dredge simply tumbled again into the hole excavated, and had to be dredged over again. The tailings elevator prevents this, for it carries the tailings far beyond the stern of the dredge, and, if necessary, can stack them to a height of 30 feet.

The separating cylinder is still another improvement. Not long ago all the wash lifted by the dredge was simply shot onto the tables—big stones, little stones—a constant stream of tons in which were a few tiny atoms of gold. Fifty or sixty tons of heavy boulders, sand, etc., were hourly shot onto the tables, causing great waste of labor, great waste of gold; for the body of water required to sweep this stuff away again carried much of the fine gold with it. Now all the wash, as it comes up in the buckets, is shot into a perforated iron cylinder, which, slowly revolving, sifts out the sand and fine stuff which contains the gold, and sends all the heavy stones direct onto the tailings elevator, which carries them clean away.

These improvements in the actual working parts of the dredge have practically made the dredge master of the ordinary difficulties met with, but there is almost as much need for improvements in gold-saving apparatus now as there ever was. It has been pointed out again and again that the small size of gravitation tables and the vibration caused by the working of the dredge are accountable for the loss of a large percentage of gold. I see no reason why gravitation tables should be limited in size to the space not occupied by machinery on the main deck of the dredge. It would be quite easy to have the gravitation tables forming the roof, as it were, of the lower deck, and extending even over a larger area than the size of the pontoons. The fine, concentrated wash, as it comes from the cylinder, could easily be elevated to the tables, and so distributed as to be spread evenly over a surface five times as large as is used now, and if this is not sufficient, or if the vibration is still a drawback, why not have the gravitation tables extended over separate pontoons not affected by the vibration. In this way very light pontoons could carry a very large area of tables, and, if this were not sufficient, then send the concentrated wash ashore and treat it there.—New Zealand Mining Standard.

IN business, as well as in society, a great deal depends upon who introduces you. In advertising, the same thing is true. Take two journals going to the same people. Your advertisement in the one having the most prestige will do you more good than it will in the other. The prestige, the character or the indefinable something about an old, established, high-class medium lends itself to your advertisement in that medium. It adds value to your goods. But every time you place your advertisement in a medium of doubtful or cheap standing, this quality also lends itself to your advertisement. Be as careful about the character of the medium you use as you are of the company you keep. Do not use a medium because it is cheap. It may be dear at any price. You cannot afford to lend your prestige to a poor journal.—Advertising Experience, Chicago.

Outline of the Geology of California with Reference to Its Mineral Deposits.

NUMBER V.

Written for the MINING AND SCIENTIFIC PRESS by HAROLD W. FAIRBANKS, Ph. D

Although the great deeps of the ocean basin have probably always been submerged, yet areas continental in size have oscillated up and down, one portion sinking while another rose to maintain an equilibrium. Instead of the Sierra Nevadas being the ancient range of California, we now think that the region of the coast mountains was elevated above the sea in most remote geological times. Following the period of gold deposition the Coast ranges began sinking again beneath the sea, which continued for an indefinitely long period except for a time, when they were temporarily re-elevated by the upwelling of great bodies of eruptive rock which is now known as serpentine. This is a peculiar rock, containing less silica than any other known rock, but carrying, in minutely disseminated quantities, the mineral known as chrome iron. As this mineral occurred originally in the rocks, it was of course without value; but Nature has taken another step and concentrated it for us. The serpentine has been fissured, and through these fissures percolating waters have passed, though under just what physical and chemical conditions we do not know. These dissolved out the chrome iron and deposited it in bunches of different sizes in the serpentine.

The Pick and Shovel mine near San Luis Obispo has been worked more than any other in California, and the deposits there are illustrative of the occurrence of chrome iron generally. When one bunch is worked out there is very little to guide the miner in finding another. Sometimes, however, a seam followed from one end of an ore body will lead to another, but it is very uncertain work. Bunches are known of more than a thousand tons weight. The areas of serpentine, and consequently those in which chrome iron may be looked for, extend in the Coast ranges from Santa Barbara county into Oregon and from Mariposa county north along the western slope of the Sierras. As a mineralogical curiosity I might mention an occurrence of chrome iron south of Shingle Springs, El Dorado county, in slate some distance from serpentine.

In some parts of California the proper conditions were present for the formation of coal beds during the Upper Cretaceous. This was notably the case in Shasta county. The beds dip beneath the lava and have been much eroded.

At the close of the Cretaceous the geography of California was again changed by an uplift in the Coast ranges. After a period of erosion sinking was inaugurated during the following period, to which we give the name of Eocene or Tejon. Again conditions for coal occurred as illustrated by the beds near Mt. Diablo, Corral Hollow and other localities in the Coast ranges. Owing to the disturbed condition of the strata, the search for coal is a puzzling and often disappointing one.

At the close of the Eocene the strata of the Coast ranges were again folded together, uplifted from the sea and subjected to erosion. Then followed a long period of subsidance through the Miocene. We have come now to the time when the greater portion of the oil-bearing strata were formed as well as quite extensive beds of coal. Wherever we find coal we know that the region must have been low and swampy on the borders of inland lakes or protected ocean lagoons. The Miocene coal is so young that its quality is poor, but it is mined from Elsinore on the south through the Coast ranges nearly to Oregon. Much of the coal in the latter State is also quite recent in formation. It is also mined at several places in the San Joaquin valley. It is dark and often brightly lustered when first mined, but soon crumbles. The intense mountain-making disturbances since the formation of these beds have so folded, faulted and eroded them that great care is necessary in determining the value of any outcrop. Only a skilled geologist can do it, and even he is liable to be mistaken unless thoroughly familiar with the local geologic conditions. Some of the best appearing beds are mere remnants left by erosion.

The conditions governing the occurrence of the oil beds are wholly different from those of the coal, and the two products are nowhere associated together. Our studies have shown clearly that the oil found at so many points through the Coast ranges has been derived almost wholly from the decay of sea animals. While the oil is now encountered in porous sandstone, it was not formed there but in the associated limestones. These are sometimes clayey and sometimes silicious, but have been formed largely of the remains of immense numbers of microscopic animals, together with fish which were sporadically entombed in the sediments. Exceptional conditions existed over the area of the Coast ranges during the latter part of the Miocene, for the quiet sea seems to have been fairly alive with minute calcareous and silicious organisms, the organic portion of whose remains go to make up the dark green oil. Several thousand feet of these sediments were formed, consolidated and finally lifted above the sea. With pressure and some accompanying heat, produced in the folding of the strata, the organic matter was distilled out and passed in many cases into the loose sandstone overlying the oil shales and limestones.

The oil-bearing rocks were termed by Prof. Whitney the Bituminous Slate series. They can often be recognized by the fetid odor on fresh surfaces as well as by their general light color and thin, even layers. They extend from Los Angeles through the Coast ranges to a point a little north of San Francisco. Though much of the region has not been carefully examined, yet the possible productive area is large. There is good evidence that the oil rocks underlie the whole of the Santa Barbara channel, but it is a question whether they can ever be tapped.

The remnant of the oil left from distillation and found over such a large section of country is known as asphaltum when found in veins and bunches more or less pure, and as bituminous rock when impregnating a loose sandstone. In the country south of San Luis Obispo great hills are found consisting of sandstone, and more of less completely impregnated with bituminous matter. The asphaltum residue represents of course an enormous quantity of oil, the volatile portions of which much have been distilled off under heat, and it is a question which yet remains to be settled whether oil can still be obtained in quantity near the great bodies of bituminous rock. At many localities in Santa Barbara county there are chimneys of baked rock in the vicinity of bituminous deposits, and the question of the relation between these is an interesting one. Intelligent study of the various geological questions connected with the occurrence of oil and asphaltum would be of great value.

A very marked disturbance took place in the Coast ranges at the close of the deposition of the oil-bearing rocks (Miocene), elevating the country again to form a prominent mountain range so that the erosive agencies began to work actively upon the exposed strata. During the Pliocene, the next geological period, sinking again commenced so as to permit the formation of strata of that age at many points along the coast, particularly at the mouths of the old rivers.

At some time during the Pliocene disturbances again arose which culminated in the outburst of volcanic rocks in the region between Clear lake and San Francisco, and to a less extent farther south, in the region of the Santa Barbara islands. These eruptions continued at intervals into the Quaternary. In northern California they were much greater in extent, building up from beneath the sea the volcanic ridge extending from Lassen's butte northward to Mount Shasta, and forming the thousands of square miles of elevated plains in northeastern part of the State, in Oregon, Washington and Idaho.

(To be Continued.)

California Diamonds.

The New York correspondent of the London *Mining Journal* believes that the prospects for diamond mining in the United States, and especially in California, are good. In a recent letter he says:

"It is not, I think, generally understood that the United States is likely enough, sooner or later, to become a diamond producing country. Records of unquestionable trustworthiness exist of diamonds having been found in Virginia and North Carolina, but the most productive State hitherto has been California. The first announcement of Californian diamonds was in 1850, in *Silliman's Journal*, and since then many genuine discoveries have from time to time been reported. The chief localities have been near Cherokee in Butte county, near Placerville in El Dorado county, French Corral in Nevada county and several places in Amador county. In Trinity county also some very minute diamond crystals have been found. Prof. F. Woehler of Gottingen some years ago examined samples of the "platinum sands" of Trinity river. After removing gold, platinum, chromic iron, silica, ruthenium, etc., by the usual methods, he observed the residue microscopically and found numerous colorless, transparent grains, which he presumed to be diamonds. Subsequent combustion in oxygen and precipitation from bayta water convinced him that the microscopic crystals were true diamonds. Having regard, therefore, to the wide area of the district over which the discoveries have been made, and to the fact that the whole of this district is of a distinctly volcanic character, and even yet is covered here and there with huge masses of lava and indurated volcanic mud, it can hardly be doubted that systematic prospecting will lead to the development of productive diamond fields. Analogous conditions, with variations of local detail, are observable in Arizona. I have myself seen on the mesa lands near Pinal many spots that I pointed out to the local prospectors as highly probable to prove diamondiferous; and on the occasion of a visit of inspection that I made in 1894 to the Upper Rancheria district of Amador county, California, I met several of the men who had found some of the more noted Californian diamonds, and was shown the exact places of the discoveries. The finds all happened in washing gold from the gravel that underlies the volcanic cap, and it is a moot question whether the gems were, properly, constituents of the lower or upper formation. But that they were merely specimens of far greater numbers cannot be doubted; and any adventurous spirit who may be willing to risk a little capital on the chance of discovering a large fortune might easily do worse than to engage in diamond hunting at Upper Rancheria. An attempt was made to interest the great DeBeers Company in the matter. It was thought that, of all men, the famous Sissy Raids (as we irreverent Yankees now call your irresolute empire builder) would appreciate the importance of protecting the diamond market. But this idea proved erroneous. So the Californian communication was probably used for curl papers, and its senders received no reply."

Drift Mining Costs.

In the Mayflower, a representative drift mine in Placer county, on the Forest Hill divide, F. Chappellet gives the following figures and data as to the cost of mining and milling the gravel, which will be of value to others engaged in similar work:

COST FOR MINING AND MILLING PER CAR—CAPACITY 1 TON—IN MAYFLOWER GRAVEL MINING CO., FOREST HILL, CAL.

Mining.	
Labor, etc	$1 00
Timber, etc	04
Transportation	05
Powder, candles, etc	10
Total	$1 19
Milling by Steam.	
Labor, wood, etc	21
Wear and tear on mill	01
Total	$ 22
Extra expense, blacksmith, etc	02
When using compressor for ventilation	01

When running the mill by water the cost is 9 cents per car less than the above estimate.

It will be observed that Mr. Chappellet states that, using water power instead of steam for running the mill, the cost of milling per car of the gravel would be but 13 cents.

The Mayflower mine has been worked some twenty years and may be taken as a good type of a drift mine with cemented gravel which costs more not only to work, but also for milling, than non-cemented gravel, the difference being, under similar circumstances otherwise, generally about 20 to 35 cents per car.

It will be interesting to those who worked similar gravels fifteen years ago to compare the figures of those days with the present. The cost of No. 2 powder then was from 25 to 28 cents a pound, and it is now being supplied for 8 cents a pound. Other supplies have fallen in price and new and cheaper methods of mining and milling have been introduced so that the cost of working such gravel as that of the Mayflower has fallen from about $3 per car to from $1.30 to $1.50.

This mine contains three distinct channels, the main Mayflower running north and south, the Orono crossing the Mayflower at a right angle crossing from the east and an upper channel following the same course as the Mayflower, but seventy-five feet higher. The Mayflower is now working two of these channels and opening the upper one. The gold on each channel is of different character and fineness. On the channels two and one-half miles of drifting has been done since the mine was opened.

Although the cost of timber and wood on the Forest Hill divide is comparatively low, it makes a great difference in the cost of any work where power is used whether steam or water power is in use. For example, in the Eureka Consolidated, Mr. Chappellet states that a tunnel 1900 feet in length, 6x6, which they have run with machine drills costs $9.50 per foot, using steam, while had it been possible to use water power the cost would not have exceeded $8 or $8.50 per foot.

J. B. Hobson, now operating in Cariboo, in a report stated that the cemented gravels there could be milled for 20 cents a carload and that twenty stamps could crush 200 tons per day, and was taken to task by the *Canadian Mining Review*. In reply, Mr. Hobson sent some data which that paper questioned. These figures from the Mayflower bear out the truth of Mr. Hobson's claim as to cost. The following is some of the data given by Mr. Hobson:

COLUMBUS WATERHOUSE'S MILL, IOWA HILL.

Number of stamps	10
Weight of stamps	1150 lbs.
Drop of stamps	6 to 8 inches
Drop of stamps per minute	95
Size of screens, round holes	⅜ inch
Water used in battery	8 miners' inches
Duty of 10 stamps for 24 hours	80 tons
Cost of mining and milling per ton	$1.85

MORNING STAR MINE, IOWA HILL.

Number of stamps	10
Number of men employed in mine and mill	70
Cost of timber for 12 months	$3050
Cost of general supplies, powder, etc., for 12 months	$6056
No. of carloads of cemented gravel milled in 12 mos	35,000
Cost of mining and milling per carload	$1.45
Dividends declared for 12 months	$121,200
Average yield of cemented gravel per ton	$4.90
Cost of mining per carload of one ton	$1.33
Cost of milling per carload of one ton	12 cents
Weight of stamps	850 lbs.
Size of screens, round holes	3-16 inch
Drop of stamps	6 to 8 inches
Drop of stamps per minute	95 to 100
Power used, Dodd's sigmoidal 36-inch water wheel, operated with 15 miners' inches of water delivered under a head of 470 feet.	
Duty of the 10 stamps per 24 hours	120 tons
Water used in battery	8 miners' inches

Mining Summary.

CALIFORNIA.

Amador.

Record: At the Potrazuba mine some rich ore has been encountered in the north drift, which is now in 80 feet; the drift south has been driven 150 feet, and an upraise is now being made to the surface. Some 700 tons of ore has been extracted, and, as soon as the weather will permit, the management expect to have another milling test made.

The work of laying 3200 feet of pipe at the Balliol mine is expected to be completed so as to start up the 40-stamp mill next week.

Ledger: Superintendent Bibo of the Union Consolidated, in consultation with the directors of the company, reached the conclusion that the proper manner in which to operate the property was to discontinue drifting and crosscutting, and sink; so on last pay day about one-half the men were discharged, and the balance continued at work sinking the shaft, which will probably be put down 1500 feet.

Butte.

At the Magalia mine, owned by Rideout & Haggin, and consisting of 1100 acres of gravel, the new shaft is 512 feet deep. The pumping is all done by compressed air, reheated below by steam. Originally the whole volume of water was raised to the surface, but Superintendent Gassaway now pumps it to the 300-foot level, where it is discharged through the old works into the creek beyond. A steam hoist at the bottom of the shaft hoists the gravel from the face of the gangway to the shaft, at present a distance of 1100 feet.

Enterprise: E. C. Paxton, from the Magalia ridge, says that every mine on the ridge is being operated and that there are fully 500 men employed in the mines along the ridge and on Butte creek.

Mercury: At Cherokee the bedrock of the ground hitherto worked in the Spring Valley is being sluiced off by hydraulic process and good returns are being made. The claim is owned by the Spring Valley Company and leased by P. L. Vincent, a local merchant. He employs forty-two men, and has permission from the Debris Commissioners to work, having built a dam ten miles down the river.

Calaveras.

Chronicle: Ex-Congressman J. A. Louttit has bonded from Mrs. J. Vandel her mine on the west slope of French hill, and a contract has already been let to L. Vandel to a sink a shaft to the depth of 50 feet on the lead.

In the Infernal gravel mine the gravel taken out is very rich. Considerable trouble is now experienced with water, and in order to obviate this difficulty a drain tunnel is now being run. The tunnel will be 250 feet in length.

Active operations have been resumed at the Green Meadow hydraulic mine, near Glencoe, by W. Clark. The claim comprises sixteen acres. The bank averages 10 feet and the water is obtained from the Clark ditch under a good pressure.

The body of water that flooded the El Encino mine a few weeks ago has finally been drained off to the drain tunnel level. The drain tunnel has been driven towards the old works for the distance of 150 feet, and it will be continued until the old works are tapped.

Prospect: The old gravel channel at San Antone camp, which in early days yielded great riches, is again being opened by Peirano and Lee. Water was the great drawback in early days, when the bed of the San Antone was worked and the channel made famous by its yields. It is now the supposition that the gravel deposits run directly under the old Cuneo store and thence under the mountains.

Seven men began labor upon the mines in Collierville district during the past week under the superintendency of J. Heard.

Inyo

Register: Best & Smith, owners of the Molus mine, have during the winter taken out enough ore to run their arrastra the coming summer. The shaft is down 80 feet and drifts 35 and 30 feet long have been run in two directions.

A deed was signed in Bishop last week conveying title to the Wild Rose mine from Harry McNamara and Pat Dowd to W. S. Couch and G. P. Doyle. The purchase price is $10,000. The mine, eight miles from Benton, has been idle for years. The work formerly done was limited, comprising a 100-foot tunnel and 130-foot shaft, but in this over $300,000 was taken out. Later Joseph McDermott sunk a 60 foot shaft, finding only base ore. The Banner mill, three miles distant, will be placed in shape to work the ore. This mill has not been used for thirteen years. A concentrating plant will be used at once, and if cyaniding experiments give satisfactory results a cyanide plant will be added.

Nevada.

Tidings: The work of putting in the new crown wheel to the North Star pump was finished last week, and the pump is once more at work after a stoppage of about four weeks. Although many miners and tributers have been forced to cease work by the flooding of the mine, the water has not crept up as fast as was expected. It is now slightly above the 1800-foot level. It was thought the 1200 level would be submerged.

Transcript: A French Corral Alex Dahlberg in his claim has run a tunnel about 50 feet from the South Yuba river, and has run in on the vein 200 feet. The ledge is from 20 inches to 3 feet in width and some of the quartz shows free gold. That in which gold cannot be seen prospects well in gold and sulphurets.

Placer.

Colfax *Sentinel*: The old Mountain Gate mine at Damascus is being slowly opened up. There are five men engaged in retimbering the old gangways.

Some weeks ago an upraise was made in the Cedar Creek tunnel. Gravel in abundance was found. Supt. A. Rodger is now preparing to prospect the channel.

The owners of the Tadpole gravel mine, near Secret House, have organized a company to work the property. The following Board of Directors have been chosen: J. L. Sparhawk, M. Poor, J. S. Sparhawk, J. Q. Ackerman and W. H. Cass. J. L. Sparhawk is manager and W. H. Cass is secretary and treasurer. The mine comprises 160 acres of land traversed by the same channel as that in the Whiskey Hill and Macedon claims, of which Secret Ravine is supposed to be the outlet.

The main tunnel at the works of the Blue Canyon Mining and Developmont Company is now in 330 feet. The rock is getting more favorable each day.

Thos. Wolford and D. P. Kidd will resume the work of developing the American Hill gravel mine in about two weeks.

Herald: The Bald Mountain mine above Last Chance has its shaft down 75 feet, and expects to reach bedrock in 40 feet more. A tunnel 1800 feet in length which had been run some years ago, and which came in too high for connection, will now be made to connect with the present shaft and the water and dirt taken out through the tunnel.

The Glen mine continues to pay well, and the company is opening ground as fast as possible to enable them to work a large crew to an advantage.

The Sailor Gravel Mining Company is working steadily with a full crew opening up ground, and all gravel passed through shows up well.

The La Trinidad quartz mine at Sailor canyon has a small crew during this winter taking care of the machinery and making developments. This company started to build a fine mill last fall, but the winter set in before they could complete the plant.

The Hancock Gravel Mining Company at Canada Hill have their tunnel in 600 feet, and are now raising to tap the channel, expecting to break through and begin gangways, crosscuts, etc., and to block out ground.

At New York canyon the Avilon mine has developed a fine body of blue gravel in 300 feet which is proving rich, and they are opening it up, employing additional men as fast as there can be room made for them.

The Herman mine is employing a crew of twenty men and the mill is running steadily, the ore showing up fully as good the past month as ever in the history of the mine.

Plumas.

Independent: The Debris Commissioners granted a permit last week to John B. Sutton & Ben L. Jones, to mine by hydraulic process at Jackson creek, near Cromberg.

George Brandt has been at the Centennial mine making needed repairs, building a new wheel and putting things in order for an early start.

Shasta.

Searchlight: Capt. Roberts, in his mine on Harrison gulch, has run three tunnels on the ledge. No. 1 is about 250 feet, while Nos. 2 and 3 are in about 300 feet, running on high-grade ore all the way. Besides these three tunnels, two crosscuts will further develop the ledge to a depth of 500 feet.

Immediately adjoining Capt. Roberts' claims is the Lucky Baldwin Extension, owned by Fowler & Hurst. The property has been developed by two tunnels, the lower giving a depth of about 180 feet; these are being connected with an upraise. From the lower tunnel a drift is being run on the ledge which has been uncovered for about one-third of the length of the claim, showing good ore all the way.

Reports of strikes are numerous, and confidence in the future of the camp is expressed on all sides.

At the National Consolidated Mining Company's property on Rich gulch arrangements are on foot to operate the machinery of the mine by electrical power furnished from the Paul & Garlick plant at Copley.

The litigation involving the ownership of the Shasta County Gold Mining and Development Company group of mines is about cleared away. Fifteen or twenty men will be put to work removing ore which will be shipped to Keswick to be used as a flux.

A working test is being made at the Keswick smelter on fifteen tons of ore taken from the Murray & Hull property above Shasta. If the ore comes up to requirements a contract will be entered into to purchase a large quantity of the ore, to be delivered at the smelter.

Free Press: Robert E. Hanley has closed down the Niagara mill after a successful run made on ore taken out in sinking 15 feet deeper in the shaft on the ledge, the lowest level in the mine, and where the ledge is 5 feet in width and shows high-grade ore. Owing to the flow of water they were compelled to cease operations. The property never looked better, and a steam pumping plant and hoisting works will probably be put in immediately.

A prospecting smelter, with a capacity of ten tons every twenty-four hours, is being erected on Clear creek under the supervision of E. Markwick. The object of the smelter is to demonstrate the successful smelting of the ores from the South Fork and Mule Mountain mines.

Work upon the John P. Jones mine near Igo is progressing rapidly. The contract for the construction of 200 feet of tunnel is completed, making a total of 400 feet, and a contract for 200 feet more will probably be let immediately. At the conclusion of this work it is expected to tap the ledge.

It is stated upon good authority that A. C. Hamilton of Virginia City will shortly begin the work of reopening the Potosi quartz mine near Muletown, the property of his brother-in-law, Senator John P. Jones.

Last week on the Princess Hydraulic Mining Company's property on Clear creek the water was turned into the long ditch which was constructed from Boulder creek to the mine, a distance of eleven miles. One giant was set to work and on Wednesday the second giant was placed in operation.

Sierra.

Enterprise: The owners of the Tippecanoe hydraulic mine, on Oregon creek between Pike City and Camptonville, have been granted a permit by the Debris Commissioners.

Siskiyou.

Journal: The day and night shifts at the Blue Gravel mine on Greenhorn are now down about 40 feet, and will soon be on bedrock, making about 6 feet to the shift. In another week the derrick will be in position, and an extra lot of men will be set at work within a couple of weeks, as Hunter & Smith intend to put on all the hands possible.

The miners at work on a small scale are not doing much lately, owing to the great amount of water in the ground from the recent heavy rainstorms, but will soon be able to start up again.

The river miners who expected to get out timbers and lay in supplies of lumber for early wingdamming have received a setback also from the late rains, which made the streams high and the roads too rough for doing much.

News: Golden & Eveleth have struck another rich pay chute in the 400-foot level of the Brown Bear mine.

The Oregonian on Salmon may be worked the coming season. It belongs to Hunter, Wallace and others, and is north of Sawyers Bar.

The Campbell property in Quartz valley will soon commence another run under the management of William Hobart, who has the property leased. The largest cut and discharge flume in this part of the country is on this property, it being 1500 feet long and 35 feet deep.

The Mabel mine, owned by Chamberlain and Timmins, will soon begin work. Mr. Chamberlain expects to resume work on the two south tunnels.

Tuolumne.

Union-Democrat: In the Soulsby drifts are being run from the 200 level, and stoping is being done on the south 200. The vein is from 18 inches to 2 feet in width and the ore gives flattering results. An air compressor is being put in and soon two Burleigh drills will be operated in the mine. Ten stamps are in operation and thirty men employed in the mine.

On the Golden Rule operations at present are confined to drifting north and south on the two veins from the 500 level and rock of a first-class grade is being taken out.

At the Black Oak ore is being extracted from the 900, where a large and rich body has been uncovered. There is a 14-foot vein, and the lowest grade ore goes high. It is estimated that 30,000 tons of ore are awaiting treatment. A 10-stamp mill is on the premises and preparations are now being made for ten additional. Forty-five men do the work at present, and this number will be increased before long.

At the App work is principally confined to drifting and stoping in the 200, 300 and 800 levels, and rock of high grade is being taken out.

At the Dutch work continues on the 200 and 300 levels, the two veins carrying 35 feet of quartz, although still carrying the footwall along on No. 3. The new blower and other machinery is being put in position, and soon the Dutch will be driven down to the 1000, 500 feet deeper than at present.

On the Alabama a depth of 220 feet has been reached in the double compartment shaft. Superintendent Nevills expects to let a contract on Monday for sinking 100 feet farther, but in the meantime sinking by day's pay continues as usual. Work so far is altogether on the east mother vein, showing 8 feet of quartz.

The Genevieve will soon have a prospecting mill, and about twenty men on the payroll. Garber & Bishop are the owners.

The Clark mine, on the east lode, will be driven deeper as soon as the water can be pumped from the shaft. The owners are Drescher & Lefevre.

Judge W. N. Harris of Jamestown will open the Junietta in early summer.

The Leap Year gravel mine in Table mountain, which has been worked off and on for a great many years, resumed operations again this week under the management of its owners, Hoskins, Lark and Hoskins.

W. N. Harris, owner of the Mazeppa, will extensively operate his mine and place a mill on the property as soon as spring opens. The Mazeppa joins the Jumper on the south.

Negotiations are under way for the opening up of the Strike-Young America mine.

Independent: The Dead Horse at Summersville is taking out some very good ore on the 1400 level.

At the Rappahannock the main shaft is being sunk by a contract and is now down 580 feet.

OREGON.

The Victory Placer Mining Company of Oregon has incorporated at Roseburg; capital stock, $5,000,000; W. H. Taylor, J. M. Stevenson, C. A. Sehlbrede. The property they propose working adjoins the Nash, or Victory mine, near Glendale, Or.

Jacksonville *Times*: More than a dozen giants are now playing in Canyon creek district, not far from Kerbyville, within a radius of six miles.

Beekman & Huffer have several men at work at their quartz mine near Jacksonville, who are engaged in stoping. They will immediately commence the construction of a 180-foot tunnel to tap the ledge.

Applegate Bros. are doing considerable development work on the La Rose ledge in Kane's creek district. They have opened the mine at different points for a distance of 400 feet, and everywhere find it showing good ore.

Medford *Monitor-Miner*: The Cameron placer mine on Applegate comprising a large amount of ground has been sold to San Francisco parties for about $50,000. A $25,000 hydraulic plant will be put in and the property will be operated on a large plan.

Baker City *Democrat*: The Virginia Consolidated shaft is now down 400 feet and will be run 100 feet deeper. Then crosscutting to the Virtue vein will be commenced.

Water at a depth of 550 feet in the shaft at the Flagstaff mine settles the problem of ore reduction by the French Flagstaff Company. There is now nothing to retard the process of mill building.

BRITISH COLUMBIA.

Spokane *Chronicle*: The Horne-Payne Syndicate has secured a bond on the True Fissure claim in the Trout Lake district. The bond calls for $50,000 with a substantial cash payment. This makes the fourth claim that this company has secured control of in the Trout Lake district, the others being the Broadview, Phillipsburg and Old Sonoma.

Frank Watson who is directing the work on the Fisher Maiden mine near Silverton has recently secured a bond on the Arlington and Burlington properties on Springer creek for $50,000: $5,000 in cash and the remainder in several short payments.

During last week twelve Slocan properties shipped ore to the amount of 658 tons. The Payne mine headed the list with 200 tons to its credit, the Slocan Star came next with 120 tons, followed by the Ruth with ninety tons.

Spokesman-Review: At Rossland in the Kootenay and Columbia but one stope is being carried along, and the output is averaging fifteen to twenty tons of high-grade ore.

In the Sunset No. 2 the Canadian Gold Fields Syndicate have sunk the shaft to a depth of 50 feet in almost a solid 4-foot streak of high-grade shipping ore. At this depth a drift was run to the west for a distance of 70 feet and showed up a body of ore of the same class on the average, being 36 inches wide.

The ore body recently struck in the White Bear continues to improve in width and grade, and is now fully 15 feet wide, the last four feet of which, says one of the principal stockholders, is of good shipping value at the present rates of transportation and treatment.

UTAH.

Mammoth *Record*: The ore body which was encountered in the Boss Tweed last week is proving to be a bonanza. It is the intention of the company to erect an ore house and put in a whim as soon as the deep snow disappears.

The vein in the Sunbeam shaft has widened to four feet, and some recent assays show sixty ounces of silver. As depth is being attained the vein matter becomes more mineralized.

The new 24x40 foot shaft-house has been completed and all arrangements have been made for going on down to a good depth at the Last Chance.

The stockholders of the Sunbeam have allowed the option on the Joab Lawerence ground to lapse, and the probabilities are that a new company will be formed to develop the claim.

A contract has been let for continuing the shaft of the Southern Eureka down another fifty feet.

A force of five men started work on the Anna Laura, and will push the shaft on down.

Silver City *Star*: A strike of a 4-foot vein of ore is reported this week at the Sunbeam. Another ore strike is reported in the Swansea this week. The new strike is on the 550-foot level and is said to be 7 feet wide and running well in silver and lead, with a high percentage of iron.

It is said to be doubtful that the Centennial Eureka Company will make a contract with the smelters for their output owing to the exorbitant charges for smelting.

IDAHO.

Mining Journal: In Boise county six men have been at work on the Jupiter this winter. A tunnel 650 feet in length has been run, 150 feet of this distance being on the ledge. The ledge varies from 30 to 40 feet in width and all carries gold.

A payment of $1000 on the Illinois mine was telegraphed to Boise from Denver by W. G. Shedd. Mr. Shedd has held a bond on the mine for some time.

The output of the Lucky Boy at Custer averages fifty tons a day, and in addition to the company's mill its ores are now being put through the Black plant.

Boise basin placer miners look for a long and prosperous season the coming summer. Early snow with rain has packed the snow in the mountains so that it will me t very slowly.

De Lamar *Nugget*: At Dewey the Florida Mountain Mining Company has discharged all its miners except the half dozen employed in running the drift upon the lower level, and the new and splendidly equipped mill at Dewey has ceased to drop its stamps. It was one of those common instances where a mill was built before the mine was ready to supply the material to keep it running; but such instances usually occur with properties on which a stock deal is being manipulated, which was not the case in this instance. About seventy-five men have been laid off at the mine and mill, and the village of Dewey with its magnificent hotel, about ready to be opened, its splendid mill and fine store and other buildings are in a condition of desuetude.

MONTANA.

Miner: A half interest in the Snohomish mine and a one-third interest in the Tramway has passed from the heirs of the McNamara estate to F. Aug. Heinze and the Montana Ore Purchasing Company. For the half interest in the Snohomish about $100,000 was paid, and $25,000 was the amount agreed upon for one-third of the Tramway lode claim.

On the Big Bonanza, a silver property, near

Walkerville, under lease to Rosenthal and Wilson, a 12-inch vein has been cut at a depth of 100 feet that assays 125 ounces to the ton in silver.

In the Altoona, at the mouth of Horse canyon, a shaft is now down 300 feet and another 300 feet will be sunk at once. On the Northwestern, also, 300 additional feet will be sunk by the company and a good deal of crosscutting done at each level.

The work of preparing the mines of the Butte and Boston Company for operation is going on steadily under Superintendent Batterman.

Sinking on the Original mine still continues and in a few days the 900 level will be reached. It is probable now that a station will be cut at the 900 level and possibly some exploration work done at that point.

WYOMING.

Wagon loads of steel piping are being sent daily from Laramie to the placers of the Big Horn Mining Company at Independence mountain. About ten of the fourteen miles of ditching have already been completed, and as soon as the weather permits 150 men will be put to work to complete the contract. The company, which is controlled by Denver and Leadville parties, owns over 1,000 acres of ground, which, it is estimated, can be worked for 10 cents per yard by means of the fine plant now being put in. This will cost fully $100,000 when completed. It is estimated, however, that it will not handle more than one-third of the water which the big ditch will carry. Active operations will commence July 1.

Work on the Rockdale placers, on Rock creek, has commenced in good earnest. The properties, consisting of several thousand acres, are owned by the Overland Gold Mining Company. Several thousand dollars' worth of hydraulic piping has been shipped. A force of men is now at work on the grounds, and active operations will begin with the coming of the first snow water, which is looked for about May 1.

SOUTH DAKOTA.

Black Hills *Times*: The Ellison hoist now being constructed by the Homestake Mining Company will, in connection with the steel tramway, represent an expenditure of $250,000. The dimensions of the present buildings are 200x90 feet and the highest part is about 80 feet, which is in the center of the hoist and covers the hoisting gallows. The hoisting gallows is 55 feet from the foundation. This frame is suspended over the shaft which is now down to the 300-foot level. The hoist will be run by a double 800 H. P. engine, which is of the latest pattern and was made especially for the Homestake Company by the Union Iron Works of San Francisco.

Weedon & Card, owners of the Red Cloud group of claims, on Deadwood gulch are extending their main tunnel. It is now in 75 feet and will have to be driven 225 feet farther to intersect the vein of ore now exposed in their old workings.

The Buxton Mining Company have arranged for regular shipments of ore from their Bonanza mine to the smelter. It is reported that from 200 to 300 tons per month will be shipped.

Clark's Forks placers, in the Big Horn country, are now attracting the attention of investors and with proper facilities they may become profitable.

The pay-roll of the Union Hill Mining Company, now operating in and around Galena camp, ranges from $15,000 to $20,000 per month, with every indication that the amount will be more than doubled before the end of the year.

On the Faust group of claims, which consists of thirty-eight locations, the development shaft is down 192 feet and is being sunk from 2 to 3 feet per day. The shaft is now in the blue shales, which are now quite soft, indicating the close proximity of an ore shoot.

Work is being continued at the Tin Crown mica mine, three miles northwest of Custer City, with a large body of excellent mica of large size having been encountered in the workings, which is being cut and boxed preparatory to its shipment to Eastern markets. The property was recently purchased by an Eastern company, who propose to operate it upon a large scale.

COLORADO.

Denver *Republican:* During February the Elkton Consolidated Company shipped a total of forty cars, which it is estimated will return the company, after all treatment charges have been deducted, between $60,000 and $70,000. The mine operating expenses for February will be about $11,000. Some of the ore shipped during the month brought nearly $400 per ton. The shipments for this week were nine cars, part smelter and part mill are. The company now has $212,000 in the treasury.

The production from the Union Company's properties for February amounted to twelve cars, which will return about $14,000. Of the twelve cars shipped, five contained smelter ore and seven mill stuff. The mine operating expenses for the same period will range between $11,000 and $12,000.

Ashton & Richardson, in prospecting from a 40-foot upraise in the 185-foot level on the Claude fraction of the Brother Jonathan have opened 2 feet of sylvanite ore, in what was considered as the footwall by the former lessees.

J. F. Brady of Chicago has ordered a hoisting plant built and will place it over the deep shaft on the Cranks group on Raven hill. The shaft is down 200 feet, and will be sunk perpendicularly to great depth.

The 500-foot station in the Moon-Anchor shaft is finished, and a crosscut for the vein started. In the 400-foot level a narrow seam of ore that has been drifted on for 45 feet has produced six tons that will ship at from $400 to $800 a ton. The property is producing its usual quantity of low-grade ore, and the plant is being increased by the addition of new boilers of 85 H. P. capacity.

On the Pharmacist the new vein in the south drift from the 300-foot station now measures 8 feet across and a considerable quantity of it is sacked for first grade, expected to run $600 a ton.

W. C. Newell has arranged with Buffalo capitalists for money to drive a tunnel 1,000 feet into Grouse mountain from the Arequa slope.

The El Paso Gold King in Poverty gulch is undergoing extensive development, and in accordance with the policy of the management no effort is made to produce more than for operating expenses. Among the surface improvements and increased equipment required before deeper working is possible a third 100 H. P. boiler is being installed, and a larger air compressor is expected before the middle of the month.

At Central City Denver parties intend putting a small plant of machinery on the Only Boy property, on Negro hill, with the intention of spending $5,000 in developing the property.

H. Grier sold his four-ninths interest in the Mexican lode last week to H. L. Morris of Denver and S. V. Jett of Central City, the consideration being a cash one.

The Golden Cloud property, at the head of Virginia canyon, has been leased and bonded by its Central City owners to the Imperial Mining and Leasing Company. The present depth of the shaft is 230 feet, and Superintendent Eby says the company intends to sink about 200 feet, to fully open up and develop the property.

A force of nearly twenty men are employed in the Gettysburg mine, on Bates hill, from which considerable mill ore is being shipped every day. Sinking is being carried on at a depth of 645 feet, the company intending to reach a depth of 700 feet on the present contract.

At the Lotus mine, in Russell gulch, sinking with three eight-hour shifts was resumed on Monday at a depth of 475 feet, the contract calling for 125 feet of sinking.

At the Topeka mine, in Russell gulch, the water is now down to the tenth level, which is a depth of nearly 900 feet, and the two bottom levels are being cleaned out so that leasers can take a block of ground. After the sump is cleaned out, it is the intention of the company to begin sinking.

The arrival in Leadville of Percy St. George of Philadelphia and Mr. J. L. Emerson of Salida means that within a very few days work will be resumed on the Pawnolos mine. This property is located in Big Evans gulch and has lain idle since 1893. At that time the mine was closed down on account of the low price of silver, but it is believed that the big iron bodies which are exposed in it will pay for the development work which may result in opening up other large ore bodies.

The Silver Mountain gold mine at Empire, owned by the Bank of Clear Creek county, has been leased and bonded to a Boston company. A. F. Ross, agent of the company, has purchased new machinery, which is now on the ground, and the further development of the property will commence at once.

At Florence the London and Cripple Creek Reduction Company, which began the erection of a 60-ton mill in November last for the treatment of oxidized gold ores, will begin operations within the week.

The El Paso Chlorination Company will erect a huge plant at this point, which will rank second in point of size of the four reduction plants at this point, as it will be built with a capacity of 150 tons daily. The larger plant is the Metallic Extraction Works at Cyanide, now treating 350 tons daily.

ARIZONA.

Prescott *Journal-Miner*: Superintendent A. J. Doran is running a drift on the 100-foot level of the Yavapai mine, one of the Little Jessie group, and has 4 feet of good ore in the face of the drift.

Col. A. O. Brodie is working about a dozen men on the Crown Point mine in Castle Creek district.

The sale of the Bullard mine may now be considered as assured. The syndicate have six men engaged in the survey and location of a pipe line from Date creek to the mine, a distance of from eighteen to twenty-four miles. They will put up a plant at the mine for the reduction of the ore on the ground. The opening up of this mine, the construction of the pipe line and the erection of a plant necessary for the reduction of the ore, means an outlay of $250,000 to $400,000.

J. C. Rankin, superintendent of Waters mine in the Santa Maria district expects to start up work on that property again within the next few days.

Mr. Strong has also bonded a mine in the Santa Maria district, and expects to put up a mill at once.

The Congress Gold Company has recently made some extensive additions to their plant, and have still others under consideration. This company has had a regular and steady increase to their output for the past two years and are planning to further increase it.

The Planet-Saturn Company is still running its plant, but will add improvements to it in the near future.

AUSTRALIA.

The Broken Hill Proprietary Company's twenty-third half yearly report for the half year ending November 30, 1896, has been received.

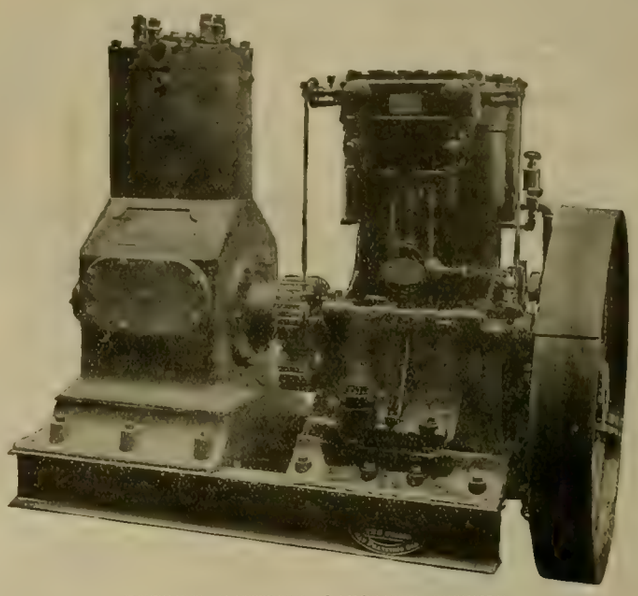
The profits for the six months have been £152,944 13s 11d, out of which sum £144,000 have been distributed in dividends. The total amount of ore mined was 220,916 tons. The following table will give the interesting data as to product and cost of working:

Ore treated, tons	208,303
Fine silver produced, ounces	4,028,292
Lead produced, tons	10,065

	£.	s.	d.
Amount received	674,361	7	3
Value per ton	3	4	9
Expenses, including depreciation	521,416	13	4
Cost per ton	2	10	1
Profit per ton	0	14	8

Duplex "Union" Gasoline Engine.

We show on this page an illustration of the pioneer plant of its kind, being a 20 H. P. duplex "Union" gasoline engine and double cylinder air compressor combined on one base.

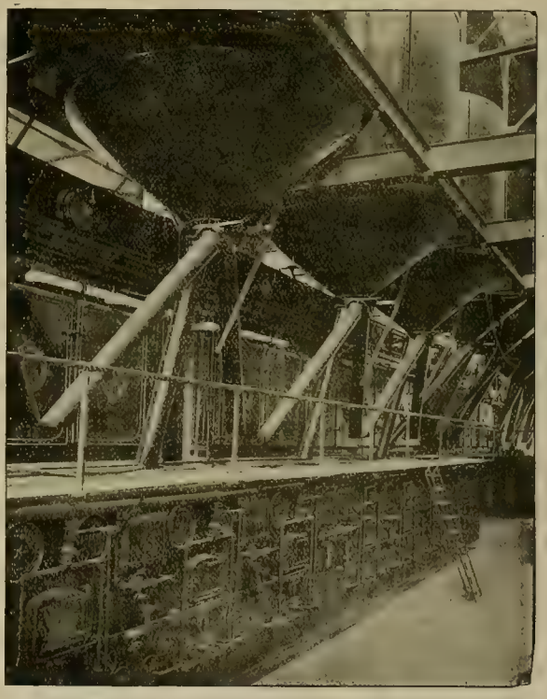


DUPLEX "UNION" GASOLINE ENGINE.

Two of these plants have been furnished to a Boston syndicate, represented by Mr. Jas. E. Mills, for use in their Mexican property. The Boston parties are the principal owners of the Calumet and Hecla mines. The engines and compressors were in sections weighing not over 350 pounds each, for mule-back transportation. In the region in which these plants are being operated good fuel and water are rather expensive, and, after a thorough investigation of the merits of gasoline engines for mining purposes, the orders were placed with the Union Gas Engine Company of San Francisco, who are the largest and oldest builders of gas and gasoline engines west of the Mississippi, and claim to have been the first to build successful gasoline engines; the first to successfully use electric ignition, as shown by their patents issued in 1885, and were the first to build gasoline engines for running mining machinery. These plants were thoroughly tested before leaving the works by experts, who were more than pleased with the results shown. *

An Advance in Methods.

Handling coal and ashes by mechanical means is now regarded as essential in all well designed boiler houses. The power station not so equipped is easily recognized by its dirtiness and by the large item on the expense account for shoveling coal and carrying away the ashes. In the Hawthorne Avenue power house of the North Chicago Street Railway Co., Chicago (view of a portion of the boiler room being shown herewith), the coal is delivered by wagons to the coal storage place beneath the sidewalk. From there it is drawn as needed into conveyor discharging into an elevator at end of room, which in turn delivers the coal into a horizontal conveyor running over the cylindrical coal tanks shown in cut. Each tank, of which there are ten, holds twenty-five tons. Capacity of machinery forty tons nut coal per hour. The ashes are drawn through discharge gates, from hoppers in basement under boilers, into a tilting car and run over track to either end of room where Link-Belt elevators raise same to storage pockets at ends of building, from whence they are drawn finally to wagons or scow and carried away.



HANDLING COAL AND ASHES IN BOILER ROOM.

This machinery was designed and installed by the Link-Belt Machinery Co., 39th St. and Stewart Ave., Chicago, whose many devices for the rapid and economical handling of all classes of freight, grain, raw and manufactured products, and for the transmission of power, are so widely employed in this country. They will be pleased to mail their latest catalogues to those interested. *

Scientific Progress.

Electricity Direct From Coal.

There is no likelihood that much more will be heard of the direct generation of electricity from carbon, if what Tesla says is to be taken as true. In a recent address he spoke on the subject as follows: "A great deal is expected from a more economical utilization of the stored energy of the carbon in a battery, but while the attainment of such a result would be hailed as a great achievement, it would not be much of an advance towards the ultimate and permanent method of obtaining power, as some engineers seem to believe. By reasons both of economy and convenience we are driven to the general adoption of a system of energy supply from central stations; and for such purposes the beauties of the mechanical generation of electricity cannot be exaggerated. The advantages of this generally accepted method are certainly so great that the probability of replacing the engine dynamos by batteries is, in my opinion, a remote one, the more so as the high-pressure steam engine and gas engine give promise of a considerably more economical thermo-dynamical conversion. Even if we had this day such an economical coal battery, its introduction in central stations would by no means be assured, as its use would entail many inconveniences and drawbacks. Very likely the carbon could not be burned in its natural form as in a boiler, but would have to be specially prepared to secure uniformity in the current generation. There would need to be a great many cells to make up the E.M.F. usually required." Tesla proceeded to specify a number of other objections to this method of obtaining electrical energy, but the preceding would appear to be sufficient in itself to dampen the hopes of those who have been anticipating the advent of electricity direct from coal.

THE temperature at the bottom of the ocean is nearly down to freezing point, and sometimes actually below it. There is a total absence of light, as far as sunlight is concerned, and there is an enormous pressure, reckoned at about one ton to the square inch in every 1000 fathoms, which is 160 times greater than that of the atmosphere we live in. At 2500 fathoms the pressure is thirty times more powerful than the steam pressure of a locomotive when drawing a train. As late as 1880 a leading zoologist explained the existence of deep-sea animals at such depths by assuming that their bodies were composed of solids and liquids of great density, and contained no air. This, however, is not the case with deep-sea fish, which are provided with air-inflated swimming bladders. If one of these fish, in full chase after its prey, happens to ascend beyond a certain level, its bladder becomes distended with the decreased pressure, and carries it, in spite of all its efforts, still higher in its course. In fact, members of this unfortunate class are liable to become victims to the unusual accident of falling upward, and no doubt meet with a violent death soon after leaving their accustomed level, and long before their bodies reach the surface in a distorted and unnatural state. Even ground sharks, brought up from a depth of no more than 500 fathoms, expire before they gain the surface.

SINCE the Madagascar campaign the value of aluminum army utensils is no longer doubted in France. Cooking and other utensils, altogether 15,000 sets, made of aluminum, proved entirely satisfactory. M. Moissan, member of the French Academy of Sciences, says in his report to the Minister of War on the labors of the commission appointed to inquire into the usefulness of aluminum for military purposes: "The committee is now in possession of full information in regard to the value of camp utensils manufactured of aluminum. The French industry is able to produce cooking utensils of aluminum by stamping, including pots, pans, cups, etc., for the whole army. The armature of helmets of aluminum has been left aside for the time being, as it wears out too quickly."

A TEST of the purity of metals, rivaling the spectroscope in delicacy, has been pointed out by Prof. J. A. Hennig, who has found that the electrical conductivity of pure metals is immensely increased by intense cold, while the increase in alloys is not more than 10 per cent.

Mechanical Progress.

Continuous Rails for Street Railroads.

Continuous rails, made up of ordinary rails length welded together electrically, are in use on many miles of electric street railways in the United States, and with excellent results, too, having shown themselves to constitute an ideal track. Whatever misgivings may have arisen at one time as to the serious pranks which expansion and contraction might play with such continuous tracks have been effectively allayed, as experience has shown that the difficulties likely to grow from these causes are not extraordinary. It is interesting, however, to note that of the troubles from temperature variations in the track, that due to a temperature lower than the one at which the rails were welded is the only one requiring serious consideration. It is found in the tendency of the rail to shrink in a longitudinal direction, and this must be counteracted by a pull on the ends of the rail sufficient to produce a corresponding amount of stretch. Temperatures above that at which the rails were welded cause compression, and this has never been found to make trouble where the track was at all secured by the roadbed.

Experience, therefore, would seem to point to the winter season as the time for welding continuous track, as then the rails are materially contracted, and, though exceptionally cold snaps may be productive of a slight state of tension in the rails, yet the maximum stress would be nothing like that in rails welded in the summer, and probably far below the strength of the welds. —Cassier's Magazine.

The Largest Reservoir in the World.

The Metropolitan Water Commission is about to build the largest storage reservoir in the world, its capacity being no less than 65,000,000,000 gallons, enough to supply the city of Boston for three and one-half years, and four times as much as the capacity of all the existing waterworks reservoirs of that city. Its capacity is twice as much as that of the new Croton reservoir of New York; thrice that of the six reservoirs of Birmingham, England; thirty times that of the Cochituate, and twenty-five times that of Hobbs Brook of the Cambridge system. It will hold more water than the inner harbor of Boston. This dam is to be built at Clinton, Mass., and the vast volume of water, covering over 4000 acres, will be entrapped and retained by a dam 1250 feet long (or 20 feet shorter than the Croton dam), 127 feet high above the ground, and 158 feet high above its rock foundation. This is, however, not as high as a number of others which retain much less water. The Croton dam has a height of 157 feet above ground and 225 above rock. —Engineering Magazine.

IN 1840 a pound of coal propelled a displacement weight of 0.578 ton eight knots; but the earning weight was only one-tenth of this, as 50 per cent of the displacement represented the machinery and fuel, 40 per cent of the hull, and 10 per cent, or 0.057 ton, the cargo. In 1850, with iron vessels and the screw propeller, a displacement weight of 0.6 ton was propelled nine knots by the pound of coal, but the proportion of cargo had risen to 27 per cent, or 0.16 ton. In 1860, with high boiler pressure and the surface condenser, 0.82 ton displacement was propelled ten knots, and the cargo was 33 per cent, or 0.27 ton. In 1880 the compound engine was in full swing, and 1.8 tons displacement was propelled ten knots, and the cargo was 50 per cent, or 0.9 ton. In 1880, in the freight steamer, 2.1 tons displacement was propelled ten knots, with still 50 per cent, or 1.05 tons of cargo. In 1895 there were two classes of freight boats. The "tramp" propelled thirty-four displacement tons eight and a half knots, with 60 per cent, or two tons of cargo. At the same time the huge cargo steamers of the North Atlantic were driving a displacement of 3.14 tons twelve knots, with 55 per cent, or 1.7 tons of cargo. On the express passenger steamers the cargo weight is down to 0.09 ton per pound of coal.

A TYPE of passenger coaches finished with copper on the outside rather than the usual paint and varnish is being put into service on the New York, New Haven & Hartford railroad. The advantage of this is that the cars are more readily kept in a condition of cleanliness and brightness, and when it is necessary to send a car to the shops for an exterior overhauling, it is ready for the service again in half the time required to paint and varnish it. All the wood panelling and sheathing is made in precisely the same manner, and a light coating of copper is formed around the wood, fitting closely into all the curves and corners. Each piece of sheathing and its strip of copper are passed through the machine simultaneously and come out ready for use with the copper wrapped tightly around the wood. After the sheathing and other members are covered or plated with copper, they are applied to the body of the car in such a manner that the exposed surfaces are not punctured by nails or other fastenings, so that when completed the casual observer would not notice but that the car was finished with paint and varnish. All joints are watertight.

ISMAY, IMRIE & Co. of the White Star steamship line have authorized Harland & Wolff of Belfast, Ireland, to build for the Liverpool and New York service a twin-screw mail and passenger steamer 704 feet long, in which extreme speed will be subordinated to the comfort and convenience of passengers. The new steamer will be 25 feet longer than the Great Eastern, hitherto the longest vessel ever built, and 65 feet longer than any vessel now afloat or in process of construction.

Electrical Progress.

"Phase."

The thorough comprehension of the meaning of the word "phase" has been attended with considerable difficulty by students engaged in electrical engineering. It seems that two views may be taken which appeal respectively to the theoretically inclined and practical mind, says the *Electrical Age*. The mathematical and physical interpretation of the term invites certain attitudes on the part of the student, endeavoring to enlist his sympathies and exercise his power of mental absorption in both directions at once. It becomes necessary to appreciate the full physical meaning of a phenomenon which, although peculiarly involved with the flow of electrical energy through a circuit, is in certain respects of a common and familiar nature. There are many occasions when a perceptible period of rest occurs between an active cause and its effect—the lightning flash and the subsequent silence until the deep reverberation and boom of atmospheric tidal waves are heard re-echoed with deafening intensity.

And in the flow of a current, between its condition of fullness and moment of origin, an interval elapses. When an electro-motive force is applied to create a flow through a given resistance, the maximum flow is not an instantaneous result of it, but a comparatively gradual growth takes place. It is as though the wire suffered from a material incapacity to instantaneously convey the electrical energy at its maximum value onward. It therefore becomes evident that if the retardation or self-induction were entirely absent, the current would attain its full strength the instant the electromotive force was applied. Phase is a term signifying time, whatever may be its cause, and its existence is due to the lack of immediate correspondence between an electromotive force and the current it excites in a given resistance. If a circuit has no self-induction and no electrostatic capacity, the maximum value of the current would be produced at once. Whatever symbolic references may be made to the meaning of phase, and in whatever relation it may be held to other phenomena, let it be always understood as a purely physical phenomenon at the first, and then let the student, with this clear conception in his mind, proceed to invade that other world of relationships, that wide-stretching panorama of exactitudes and sine functions.

AN electric landau caused some sensation on the London streets lately. It demonstrated the fact that the horseless carriage can be steered through the crowded thoroughfares with facility.

A NEW YORK electrician has devised a scheme for the indefinite preservation of eggs by an electric current sufficient in strength to destroy germ life.

Practical Information.

Occasionally Forgotten.

Specific heat is the measure of the capacity of any substance for heat, or the ratio of the amount of heat required to raise the temperature of a substance 1 degree to the amount of heat required to raise an equal weight of water to 1 degree F.

The specific heat of water is 1; cast iron, .13; steel, .11; air, .23; copper, .10; lead, .03; steam, .48.

Heat units required to raise the temperature of any substance: Multiply weight of substance in pounds by number of degrees to be raised, and this product by the specific heat.

A heat unit is amount of heat required to raise the temperature of one pound of water 1 degree F.

A heat unit is capable of doing 772-foot pounds of work, or 772-foot pounds of work done is capable of producing one heat unit.

The foot pound is the unit of work done, and one pound weight moved one foot.

Force is that which tends to move any weight, and the work done by the force is measured by the intensity of the force, times the distance through which it acts, measured in the direction of the force.

Power is the rate at which any agent can work, and is the product of force, distance and time.

The unit of power is the horse power, and the doing of 33,000-foot pounds of work in one minute.

Sensible heat can be measured by the thermometer. Latent heat is the heat required to convert one pound of water at a given temperature into steam at same temperature.

A pound of good coal contains about 14,500 heat units.

The Congressional Library.

In building the National library at Washington so careful has the expense, $6,000,000, been guarded, that it was found possible, as the building approached completion, to go more largely into interior decoration than was anticipated in the original estimates. As a result, the building is extremely rich in its interior finish, abounding in marbles of all the choicest varieties, mosaics and frescoes, and it is so full of daylight in nearly every portion that its beauties can be perfectly seen; in this respect it differs from most of our best

public edifices. In plan the building is simply a cross, with two long arms and two short ones, set down in a hollow square, leaving four large courtyards. In the center of the cross is the octagonal reading room, occupying a magnificent rotunda. The long arms of the cross, extending northward and southward from the reading room, are the great twin book-stacks, each of which is nine stories in height and will contain 800,000 volumes. Electric book railways, on the principle of an endless chain carrying small racks, connect every part of the stacks with the delivery desk in the center of the reading room.

By the operations of the copyright law since 1876, the Congressional library has secured for its shelves one copy of every book (with very few exceptions) published in the United States, besides a second copy of each, which is preserved and filed for use as documentary evidence in law cases involving copyrights. With much that is practically worthless, the library has thus gathered every valuable work issued in this country for a score of years, while, by purchases abroad, it has aimed to keep fairly well supplied with the important publications, of not too special character, of every European country.

Packing of Goods for Chile.

Consul Dobbs writes from Valparaiso: "Many American manufacturers still do not seem to realize the harm they are doing themselves and American trade generally by putting up their goods in too slight packages. Shirts, soap, toilet articles, and many kinds of canned goods, just exactly the packages which offer most temptation, often come in very thin boxes, without any protection in the way of wire or sheet-iron bands, nailed with short, wire nails, easily drawn, and the Chilean longshoreman or lighterman, expert in the use of the short, strong knife he carries, often makes a nice plunder right under the eyes of the officers of the steamers. Then, again, in heavier articles, which offer no temptation to theft, the cases are not strong enough to withstand the very rough handling they receive. The peon likes to see a good smash, and not only handles the cases roughly, but if he is not watched will deliberately drop a case in such a way as to smash it, just to see it break, and with the same enjoyment that a small boy throws stones through a window. Whenever possible, packing should be done in such a manner that the package could not be broken open by ordinary means or by being dropped. A case in point occurred the other day. A lot of miscellaneous bronze and brass repairs for mining machinery came in what was a little stronger than a cracker box. It broke open in the ship's hold, and certainly many small parts were lost, probably some of them of vital importance. A peon was detected in carrying off some small castings in his bundle, not that they were of any use to him, but simply apparently for the sake of stealing. A prominent Chilean importer of American goods said to me the other day: 'If American manufacturers only knew how to pack goods as well as they know how to make them, American trade in South America would very soon make a better comparison with English and German trade than it does to-day.'"

MR. WM. CLIFFORD of Pittsburg, Pa., at a recent meeting of the Ohio Institute of Mining Engineers, gave a *resume* of the anthracite industry and the present magnitude of the same, reminding his hearers that coal is now in the earth's crust—none is being formed at the present time. He gave it as his opinion that, at the present rate of consumption, 1000 years will probably be the limit of our available fields, but the consumption is doubled every ten years. The coal of the world is not likely to last as long as the human race.

Wanted: Good Engine Lathe.

24 to 30-Inch Swing. State condition, maker's name, and price. Address "LATHE," Mining and Scientific Press, San Francisco.

PROPOSALS FOR ROCK CRUSHER.

The Board of Supervisors of Butte County, California, hereby invites plans, specifications and proposals for furnishing the following named machinery, viz:

One Rock Crusher, with a capacity for crushing not less than 12 to 15 tons of rock, or cobble-stones 6 to 9 inches in diameter, per hour, at ordinary speed, rock to be crushed to not over 2 inches in diameter. Bids to state the price per foot for elevator attachment, and of rock screens.

One Road Roller, not less than 5 feet in width and to weigh not less than five tons.

All of the above machinery to be first class in every respect.

Bids will be received by the Clerk of the Board at his office in Oroville, Butte County, California, up to Wednesday, April 7, 1897, at 10 A. M. The right to reject any and all bids is hereby reserved.

By order of the Board of Supervisors.

ED HARKNESS, County Clerk.

Oroville, Cal., March 9, 1897.

WANTED.

—A—

Hoisting and Compressor PLANT,

Complete with BOILERS, PUMPS, Etc.

Hoisting Engine Must Be Double Drum and Capable of Hoisting One Thousand Feet.

Send full particulars to

MACHINERY,

This Office.

Wanted:

Some quartz mining company who are just starting out in business, or a company who are dissatisfied with their superintendent, or some manager who is dissatisfied with his assistants, or any one in the mining business to give me a job. I have a job, but I want a better one. I WANT MORE WORK AND I WANT MORE PAY. I have run the whole works of a 60-stamp plant. I can make an assay, retort and melt bullion, build roads and bridges, keep books, run a store—in short, I can do what a mine manager should be able to do. I am 33 years old, am married, and will contract for two or more years with a responsible party anywhere on earth. Could begin shortly after a proper agreement was entered into. CAN FURNISH REFERENCES TO SATISFY THE MOST SCRUPULOUS. To avoid delays, address

JOHN P. SCHMIT,

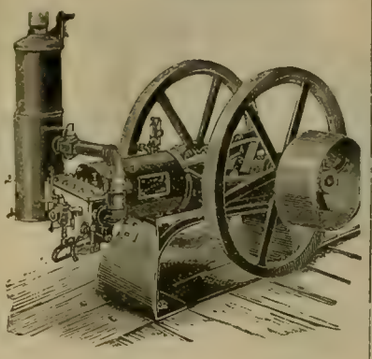
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LOS ANGELES.....CALIFORNIA.

Cripple Creek—Its History to Date, Illustrated.

Just out, with correct map and costly full page views natural as life. This great book will be sent free prepaid with our big 56-col. family paper 3 months on trial for 25c (stamps or silver); club of 6, $1. Latest mining news. Mention The Press and address *Illustrated Weekly Sentinel*, Denver, Colo.

Cheap Power!



SAVE MONEY BY USING

—THE—

"DANIEL BEST" Crude Oil Engine.

This Engine can be operated on either Crude Oil, Distillate, Gasoline, or Kerosene. **It is the cheapest power on earth** and is not tied to any one kind of Oil, but can use any kind that will make gas and is not handicapped by being compelled to use a certain Oil. Do not forget this when in need of an Engine.

We guarantee our Engines to work perfectly on California Crude Oil, or Distillate, or any other kind of gaseous Oil; we however prefer CALIFORNIA CRUDE OIL, from Coalinga, Fresno county, for the reason that gas from Crude Oil will produce more power from the number of feet of gas used than from any other Oil, and it is also a natural lubricant as well, the valves being always lubricated sufficiently to prevent them from sticking, thus assuring greater durability of the working parts than it otherwise would be in using dry gas. And another advantage we claim is, that danger from explosions is reduced to a minimum, there being no accumulation of gas, but is used by the Engine as fast as it is generated and hence is absolutely safe. The following is a test that we made with one of our Five-Horse Power Crude Oil Engines, running ten hours on the different gas oils:

California Crude Oil, 40 grav..	7½ galls.	at 5c..	$.37½
Distillate.....	40 "	7½ "	8c..	.60
Domestic Coal Oil....	40 "	7½ "	12½c..	.93¾
Gasoline.....	74 "	8¾ "	15c..	1.31¼
City Gas.....	1000 feet,			2.00

We manufacture all sizes from two-horse power up, and will guarantee that our Engines will run cheaper and are more simple in construction, have fewer parts and hence are more durable than any other Gas Engines on the market. Seeing is believing; don't take our word for it, but come and investigate for yourselves. You can always see one in operation at our works. We will be pleased to see you and will at all times take pleasure in showing them up. Our Engines are specially adapted for running well and mining machinery—in fact, for any kind of power desired. We are the pioneers and first inventors of Crude Oil and Distillate Engines. **We always lead and never follow.** Send for Catalogue and Price List of the only genuine Crude Oil and Distillate Engine made.

The Best M'f'g Company,

SAN LEANDRO, CAL.

QUICKSILVER!

—FOR SALE BY—

The Eureka Company,

OF SAN FRANCISCO.

ROOM 1, - 426 CALIFORNIA STREET, SAN FRANCISCO.

"CRACK PROOF"

PURE RUBBER BOOTS

Are the CHEAPEST because

They Are the Most Durable.

BEWARE OF IMITATIONS.

See that the heels are stamped

"Union India Rubber Co. Crack Proof."

BEST QUALITY

Belting, Packing and Hose.

Gold Seal, Badger and Pioneer.

Manufactured only by

GOODYEAR RUBBER CO.

R. H. PEASE, Vice-Pres't and Manager,
Nos. 573, 575, 577, 579 MARKET ST., San Francisco.
Nos. 73, 75 FIRST ST., Portland, Or.

THE GOLD and SILVER EXTRACTION COMPANY, OF AMERICA, LTD.

CAPITAL, - $550,000.

The Original Cyanide Process.

SIMPLE. RELIABLE. ECONOMICAL.

TRADE MARK.



MACARTHUR-FORREST PROCESS

Gold Medal, Columbian Exposition, 1893.

MINE OWNERS and others having Refractory and Low Grade Gold and Silver Ores and Tailings should have their material tested by

The MacArthur-Forrest Cyanide Process.

Samples assayed and fully reported upon. Particulars upon application.

Advisory Board in the United States: Geo. A. Anderson, General Manager; Hugh Butler, Attorney; W. S. Ward; J. Stanley Muir, Technical Manager.

California and Nevada Agent, Bertram Hunt, 216 Sansome Street, San Francisco.

OFFICE: MCPHEE BUILDING, DENVER, COLORADO.

ORES! ORES!

Gold, Silver and Lead Ores and Concentrates

PURCHASED AT REDUCED RATES FOR TREATMENT.

SELBY SMELTING & LEAD CO.

416 Montgomery St., San Francisco.

Consign shipments to Vallejo Junction, Cal.

The Russell Process.

For information concerning this process for the reduction of ores containing precious metals, and terms of license, apply to

THE RUSSELL PROCESS CO.,

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GEAR CUTTING and MODELS.

Experimental Machinery and Repair Works of All Kinds.

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THE HALLIDIE ROPEWAY

Stands pre-eminent for the transportation of Ore, Fuel and other materials over mountainous and rugged country.

Parties desiring to remove large quantities of Sand, Gravel, Earth, Ore, Rock, to construct Dams, Levees or Embankments, etc., can do more efficient work at less cost by the

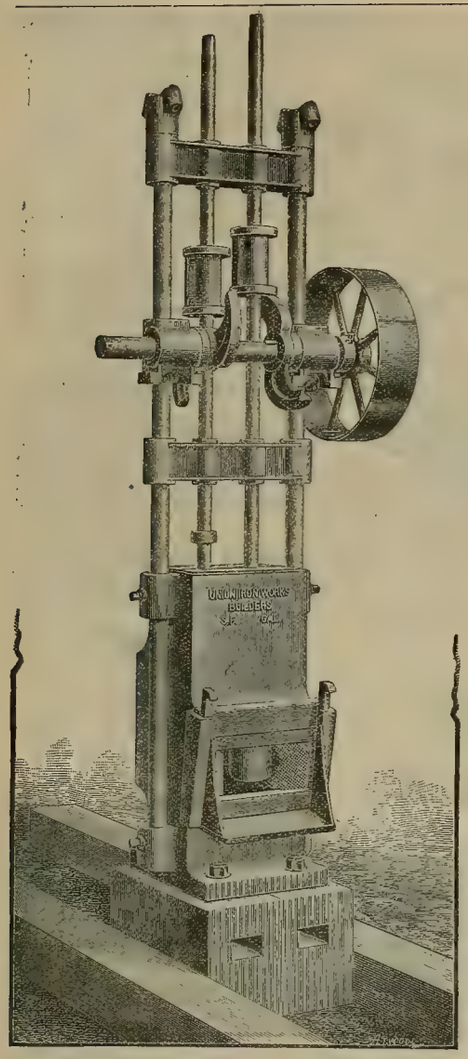
Hallidie System of Ropeway Transportation

Than by any other known system.

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PROSPECTING BATTERY.

UNION IRON WORKS,

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THIS : :

Two-Stamp Self-Contained Battery

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THE UNION IRON WORKS

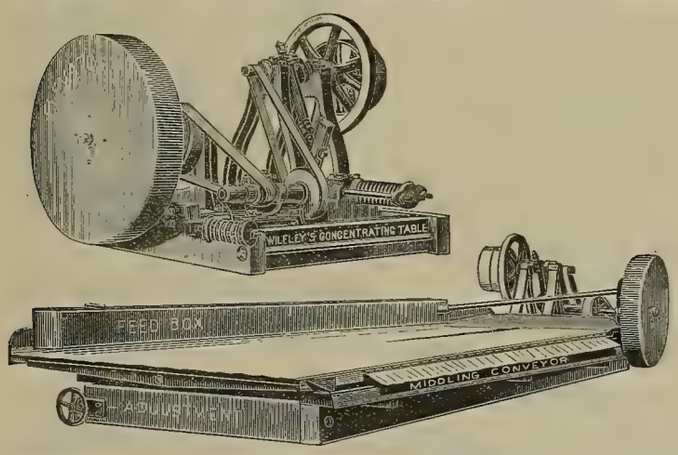
Expressly for Prospecting Work.

It was awarded First Prize at the recent Mechanics' and Manufacturers' Fair, where it was in daily operation, crushing ores from various mines throughout the State.

Weight of stamps, 275 pounds each; capacity of battery, determined by actual work, 200 pounds per hour, through a No. 7 slot-punched screen.

Entire battery weighs about 3000 pounds; heaviest piece, mortar, weighing 1200 pounds.

Can be taken apart and transported to any locality.



The Mine and Smelter Supply Co.,

. . . DENVER, COLORADO, . . .

ARE SOLE AGENTS FOR THE

Wilfley Concentrating Table,

And claim for it BETTER work than any Concentrator made, with a capacity of from 15 to 25 tons per day of 24 hours. It is simplicity itself. No moving belts or intricate parts. Anyone can learn to operate in an hour.

For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Col.; M. E. Smith Concentrator, Golden, Col.; Mary Murphy Mine, St. Elmo, Col.; W. E. Renshaw, Mayflower Mill, Idaho Springs Col.; W. H. Bellows, Boyd Mill, Boulder, Col.; H. E. Woods, Denver, Col.

ROMLEY, COLO., Jan. 19, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Answering yours of the 5th inst., would state that after a thorough trial we have discarded seven Woodbury Tables and two Johnsons and adopted the Wilfley Concentrating Table, which we think up to date is the best table in the market, so far as our knowledge is concerned. Yours very truly, [SIGNED] B. B. MORLEY, M'g'r Golf M. & M. Co.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

PRICE, $450.00.

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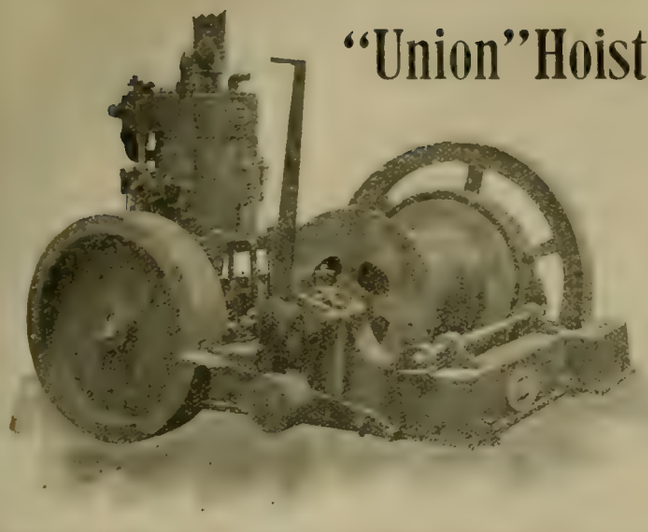
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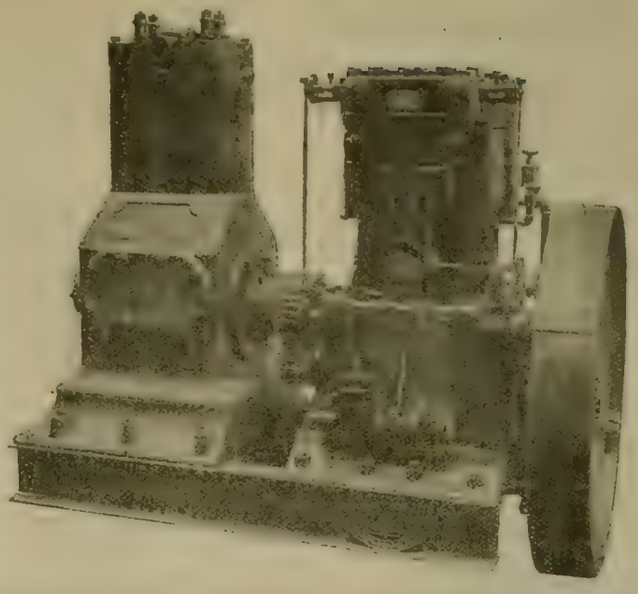
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The above cut represents our 10 h. p. Double Cylinder Engine of latest type, and Hoist combined on strong iron base. This Hoist is designed to raise one ton 125 feet per minute from an inclined shaft, or 1500 pounds at the same speed vertical lift. The drum will hold over 600 feet of ⅝-inch cable. The outfit weighs 3500 pounds.



The above cut illustrates the 30 h. p. "Union" Duplex Gasoline, or Distillate, Engine and Double Cylinder Air Compressor combined on iron base. Space occupied 6x1x5 feet. Weight, 6000 pounds. Made in sections each weighing less than 350 pounds.

THE UNION GAS ENGINE CO.

BUILD THE

"Union" Gas Engines, Which Use Either Manufactured or Natural Gas, Ordinary Stove Gasoline (Naphtha or Benzine), Distillate or Kerosene.

STATIONARY ENGINES for All Kinds of Work, Built in Sizes from 3 to 200 h. p.
"UNION" COMBINED HOISTS in Sizes from 2 to 40 h. p.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.

"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
TEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are in Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office: 314 Howard Street, San Francisco, Cal.

Coast Industrial Notes.

A Muncie, Indiana, glass manufacturer has an order for sixty carloads of glass for San Francisco to replace European glass, which has heretofore supplied the Pacific coast.

—Two-fifths of the orange crop of southern California this year comes from Riverside, where there are 20,000 acres in orchard, the net earnings of which are estimated at $1,000,000, or $50 an acre.

—The Great Northern and Northern Pacific railroads are soon to run solid trains over the O. R. & N. road. It is understood that the Great Northern will change its terminus from Seattle, Wash., to the Columbia river.

—The Columbia Southern Railroad, capital stock $100,000, has incorporated at Dalles, Or. The terminal points are Biggs Station, on the O. R. & N., and Prineville, Or. The contract specifies that construction shall commence May 1.

—As a sample of the variety in California climate, at Moosa, San Diego Co., last week, the wife of Warland Tower made ice cream from ice frozen naturally 500 feet distant from the orange orchard wherein it was eaten some hours later, and freshly plucked strawberries furnished the flavoring.

—The Redondo Railway Beach and Hotel Companies have re-elected President L. T. Garsney, Vice-President P. T. Morgan, Secretary and Treasurer H. B. Ainsworth. The stockholders have authorized the purchase of steel rails to replace the company's tracks between Los Angeles and Redondo.

—The beet sugar factory to be erected near Salinas, Monterey county, Cal., will be the largest in the world, and with its warehouses, etc., will cover 523 acres. The largest building will be 586 feet in length, 106 feet wide and six stories high. The crushing capacity will be 3000 tons daily, which will produce 450 tons of refined sugar.

—The construction of another large ditch in southern Oregon is proposed, tapping Rogue river on the north side, the capacity of the ditch to be 10,000 inches and the course about 70 miles. It is claimed that 15,000 acres of farming land and 3500 acres of mineral land will be subject to the proposed ditch. The cost is estimated at $400,000.

—Proposals have been made to the Mexican Government by an American syndicate for the purchase of the Tehuantepec Railway, and the subject submitted to a special committee for consideration; it will not be countenanced. A corps of engineers has been appointed by the department of communications to report on the probable cost of improving Salina Cruz and Coatzacoalcos harbors with a view of shortly inaugurating work.

—Receiver C. J. Smith of the Oregon Improvement Company reports in operations for the year ending November 30, 1896, that the total earnings of all branches were $3,221,620.75, as compared with $3,258,503.75 in 1895—a decrease of $36,883. The operating expenses were $2,867,380.37, as compared with $2,868,586.37—a decrease of $1206 14. The net earnings were $354,240.38, as compared with $389,917.24—a decrease of $35,676 86. The Pacific Coast Steamship Company has a profit balance for the year of $4373.82. The Pacific Railway Company shows a loss of $68,929 06. The Columbia and Puget Sound Railroad, a local coal road, has a profit balance of $118,216.21. The Seattle and Northern made a profit of $12,969.61. The Port Townsend Southern Railroad was run at a loss of $13,783.07. The coal sales of the company were 15,000 tons in excess of the previous year, and profits were about $11,000. The receiver says this was accomplished in the face of the lowest prices ever made on foreign coal in the San Francisco market.

Recent California Mining Incorporations.

Amargosa Mining and Milling Company, Los Angeles; capital stock $1,000,000—$800,000 subscribed. E. T. Loy, J. H. Hurin, H. B. Eakins, D. C. Naver, Los Angeles; P. J. Keeler, Santa Monica.

Marguerite Gravel and Quartz M. Co., San Francisco; capital stock, $2,000,000—$1,996,000 subscribed. W. J. Smith, C. H. Parrish, L. Reckless, J. F. McNamara, C. H. Smith.

Trophy Mining Company, Ferndale, Humboldt county; capital stock, $100,000—$70,000 subscribed. T. Dungan, China Flat; C. A. Berding, H. C. Blum, C. H. Dungan, J. Smith, Ferndale.

Big Seven M. Co., San Jose, Cal.; capital stock, $100,000—$43,750 subscribed. H. C. Pfister, W. Denker, G. Loeb, A. J. Rhein, W. A. Bowden, San Jose.

Petticoat Mining Company, San Francisco; capital stock, $500,000—$100 subscribed. C. Gross, J. T. Henry, H. McAllister, I. Frohman, G. B. Tennant.

Valmere M. and M. Co., Los Angeles; capital stock, $300,000—$50,000 subscribed; F. E. Nelson, Los Angeles; R. A. Matthews, N. Ross, Randsburg; J. T. Matthews, Needles; J. Suter, Barstow; M. A. Graham, San Diego, Cal.; C. R. Matthews, Williams, Ariz.

Recently Declared Mining Dividends.

Silver King, Utah, $37,500, payable March 10.

Utah, Utah, $2000, payable March 10.

Bullion - Beck, Utah, $50,000, payable March 20.

Ontario, Utah, $15,000, payable March 4. The total to date is $13,385,000.

Daly, Utah, $37,500, payable March 4, a total of $2,965,000.

Personal.

W. E. HOWARD is engaged in developing the Montezuma mine at Alamo, Lower California.

FRANK A. LEACH of Oakland will succeed Jno. Daggett as superintendent of the San Francisco mint.

G. MORTON, second vice-president and treasurer of the Mexican National Railway, is visiting San Francisco.

W. L. AUSTIN of Denver has been elected president of the Colorado Scientific Society, and Irving Hale first vice-president.

ALF. TREGIDGO of Nevada county will be appointed by Gov. Budd State Debris Commissioner to succeed John F. Kidder.

WILLIAM A. HAWLEY of Grass Valley, Cal., has returned from South Africa, where he has been superintending a mining property.

FRANCIS HEURTEVANT, who is interested in large mining operations at Red Hill, Trinity county, Cal., returned last week from a visit to France.

JAS. CRONAN has resigned the superintendency of the Hale & Norcross mine, Virginia City, Nev., to look after his Rossland, B. C., mining interests.

COL. GEORGE STONE, president Santa Rosa & Sonoma County Electric Railway, is in New York to negotiate the sale of $700,000 worth of the company's bonds.

CHARLES F. HOFFMAN, who is in Siberia, in the interests of a syndicate controlling large gravel deposits, was at last accounts at Blagoverschensk, on the Amoor river.

RUSSELL L. DUNN, who went to Siberia last summer to examine and report upon extensive gravel mines controlled by a Parisian syndicate, has returned to San Francisco.

G. F. HERR, recently traveling passenger agent of the Union Pacific, is promoted to the office of division passenger agent of the Southern Pacific, with headquarters at Los Angeles.

JAMES F. WARDNER has for some time been operating in mines at Rossland and Trail, British Columbia. Not long since he had occasion to go East, and asked the agent at the Kootenay town he was in for a pass. A telegram was sent to headquarters for instruction and the answer that came was: "Don't let Jim walk." The wily agent obtained some subsistence from Mr. Wardner by changing the telegram to "Don't; let Jim walk," before handing over the pass.

THERE are 360 mountains in the United States which have a height exceeding 10,000 feet. The greatest number is in Colorado and Utah.

Book Reviews.

Gas, Gasoline and Oil Vapor Engines: By Gardner D. Hiscock, M.E. This is the first book on the subject of explosive motors published, and it cannot but fill a want, for there has been a great deal of attention given of late to this class of machinery. The use for larger power has so greatly increased the field that a good work on the subject has become almost a necessity. This work is designed for the general information of every one interested in this new motor power. The book treats of the theory and practice of gas, gasoline and oil engines, as designed and manufactured in the United States. It also contains chapters on horseless vehicles, electric lighting, marine propulsion, etc., and is illustrated with 220 engravings. Published by Norman W. Henley & Co., 132 Nassau St., N. Y. Price, $2.50.

Annual Report of the Board of Regents of the Smithsonian Institute: This work contains much matter that shows the good that is being done with the income from the foundation of James Smithson. Among the articles in the appendix are: "On the Magnitude of the Solar System," by William Harkness; "Terrestrial Magnetism," by Prof. W. A. Rucker; "The Age of Electricity," by M. Mascart; "Weather Making, Ancient and Modern," by Mark W. Harrington; "The Promotion of Further Discoveries in the Arctic and Antarctic Regions," by Sir Clements W. Markham.

Gold in Australia.

The value of the gold raised in the various colonies differs very materially, as will be seen from the following table, giving the yield and value in 1895:

	Weight, ozs.	*Value, £*	*Value per oz. £ s. d.*
New South Wales	360,165	1,315,929	3 13 4
Victoria	740,036	2,960,344	4 0 0
Queensland	626,299	2,210,887	3 10 6
South Australia	47,343	128,812	3 14 5
West Australia	231,513	879,748	3 16 0
Tasmania	54,964	212,730	3 17 10
New Zealand	293,491	1,162,164	3 19 10
Australasia	2,353,811	8,870,644	3 15 4

The gold yield of Western Australia for the year 1896 amounted to 281,265 ounces, being an increase of 49,753 ounces as compared with that of the previous year.

At the Broken Hill Proprietary mines 27,591 tons of ore were treated for the four weeks ending February 4, and the output from the refinery was 413 ounces gold (estimated), 584,655 ounces silver, 2323 tons lead, 58 tons antimonial lead (estimated), and 386 tons copper matte, containing 59 tons copper (estimated), and 38,838 ounces silver (estimated).

Professional Cards.

HERBERT LANG,
Mining and Smelting Engineer,
Albany Hotel, Oakland, Cal.

WADE & WADE,
Analytical Chemists and Assayers,
115½ N. Main St., Los Angeles, Cal.

D. B. HUNTLEY,
Mining Engineer and Metallurgist,
De Lamar, Owyhee Co., Idaho.

D. H. JACKSON,
Placerville, California. Cable address, Ixa.
MINING ENGINEER.
Reports on Mines and Methods of Ore Treatment. California Mines Specialties.

BERNARD MACDONALD,
Consulting Mining Engineer,
BUTTE, MONTANA.
Codes: Bedford McNeils and Moreing & Neils.

BERTRAM HUNT, P.I.C. F.C.S.
Chemist and Metallurgist.
(Agent Gold and Silver Ex. Co. of America, Ltd.) 216 SANSOME STREET, S. F., CAL.

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EVELETH & MacLYMONT,
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Opposite Palace Hotel.

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Mining and Metallurgical Work in All Branches.
Assays, Chemical Analysis of Ores and experiments on rebellious ores for treatment by cyanide or other processes. Surveys and reports upon mining properties.

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JONES & EDMONDSON, LAWYERS.
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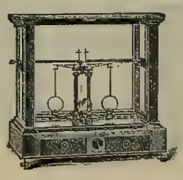
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F. CLERICI, Manager for U. S.

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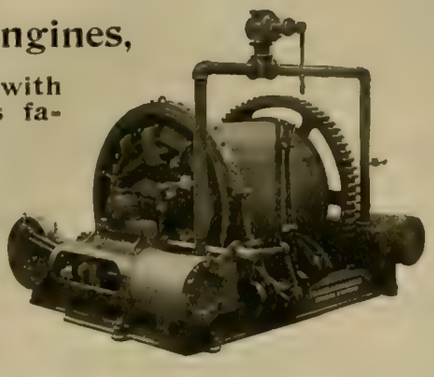

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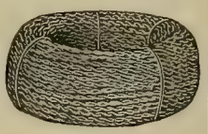
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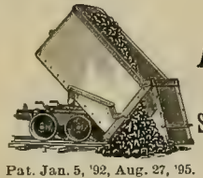
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List of U. S. Patents for Pacific Coast Inventors.

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FOR THE WEEK ENDING MARCH 2d, 1897.

578,001.—CURRENT MOTOR—C. A. Barron, Seattle, Wash.
578,211.—SAFETY CLEVIS—B. O Clark, Pasadena, Cal.
578,218.—LOG CARRIER—R. E. L. and A. J. Daggs, Phœnix, A. T.
578,214.—PUNCH—W. C. Dillingham, Los Angeles, Cal.
578,290.—PRUNE HARVESTER—A. B. Enns, Dallas, Or.
577,948.—TOOL—Ford & Mahler, S. F.
578,062.—ROTARY ENGINE—H. L. Lightner, S. F.
577,963.—BOTTLE—C. A. Lord, S. F.
578,306.—THILL COUPLING—E. T. Martin, Portland, Or.
578,067.—FRUIT GRADER—S. McGarvin, San Jose, Cal.
578,264.—BATH TUB—E. M. Reinhardt, San Diego, Cal.
578,038.—GUN BARREL—J. Singer, Los Angeles, Cal.
577,992.—GAS GOVERNOR—C. A. Switzer, Los Angeles, Cal.
577,970.—STREET CLEANER—J. B. Tilton, Fresno, Cal.
577,936.—ROTARY PUMP—E. J. Verrue, S. F.

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Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

ROTATING GRAVITY ENGINE.—Henry L. Lightner, San Francisco, Cal. No. 578,062. Dated March 2, 1897. This invention relates to an improvement in engines. It consists essentially of cylinders standing radially with relation to a journal shaft to which they are centrally connected so as to revolve therewith, weights slidable from end to end of said cylinders, pipes connecting the opposite ends of the cylinders with the hollow shafts or trunnions about which they are revoluble, and a supply pipe connected with one end of the shaft, valves whereby steam is admitted under pressure into the cylinders, an actuating device by which the valves are opened when the ends of the cylinders successively pass the lowest point in their revolution so that the weights are forced to the opposite and upper ends of the cylinders, exhaust pipes connecting the ends of the cylinders with the shaft or trunnion opposite to the inlet pipe for the escape of steam and mechanism for opening the exhaust valve when they reach the upper part of their revolution so as to allow the escape of steam and the free movement of the weights in that direction.

FRUIT GRADER.—Smith McGarvin, San Jose, Cal. No. 578,067. Dated March 2, 1897. This invention relates to an improved apparatus for grading fruit, and especially prunes and other fruits which may be of different sizes and which it is desirable to separate from each other. It consists essentially of a series of superposed oppositely inclined screens having perforations of diminishing diameter from the top to the bottom, parallel receiving floors beneath each screen, means for discharging from each of said floors to the screen next below, a means for discharging from the lower ends of each of the screens into receiving boxes and oppositely oscillating frames at each end of the screens to which said screens are connected alternately so that those inclining in one direction will be carried by one frame and those in the other by the opposite frame. Springs connect each frame with an intermediate fixed support so as to give them an upward and return movement and partially counterbalance the frames in their movements. In conjunction with this is a hopper having a flexible bottom, the free edge of which rests against the slats of the distributing belt or elevator so that each slat in passing will take away a certain amount of the fruit and deliver it upon the screens while the flexible bottom prevents the escape of any portion through the bottom.

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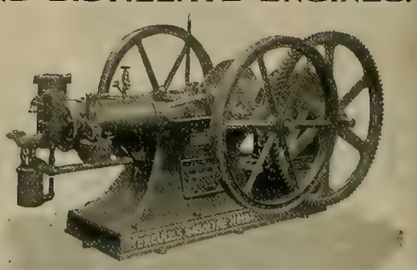
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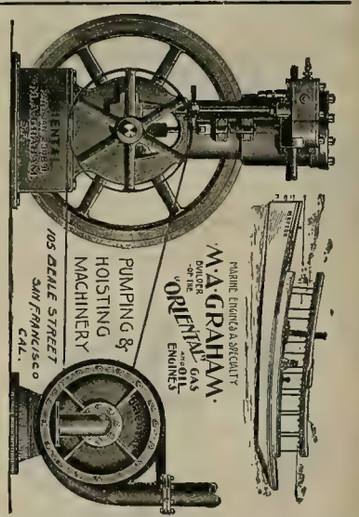
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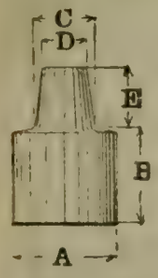
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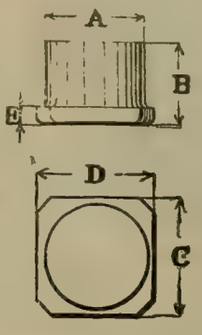
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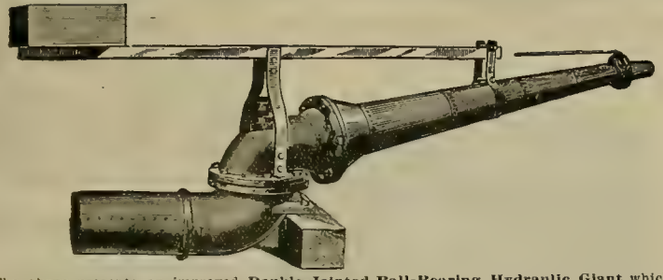
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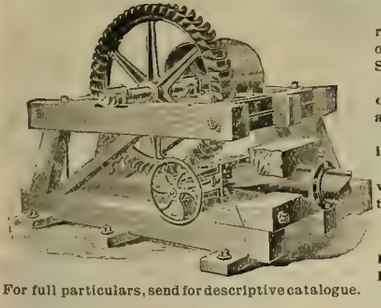
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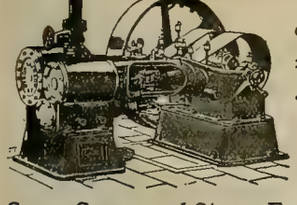
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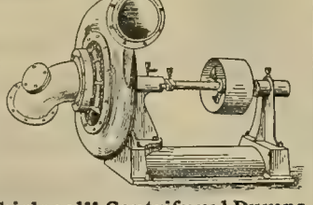
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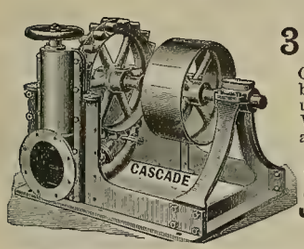
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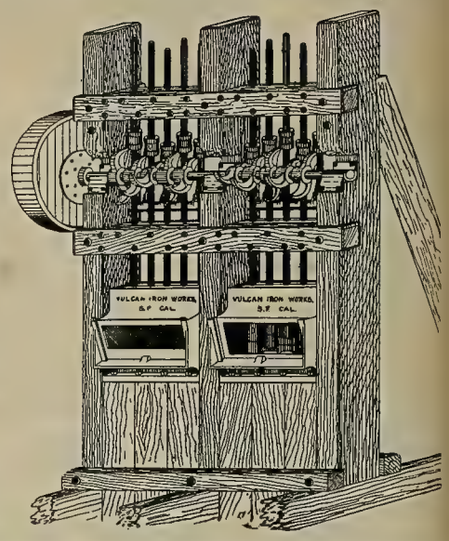
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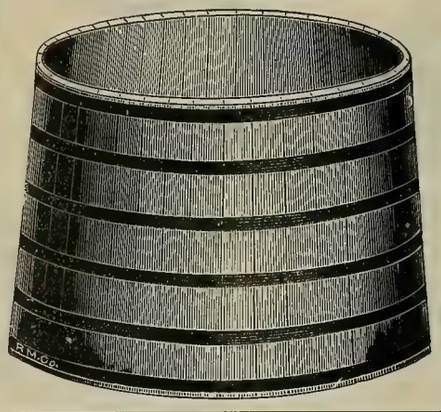
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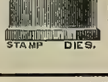
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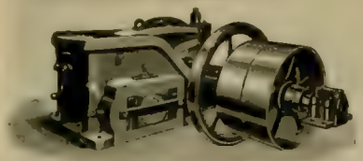
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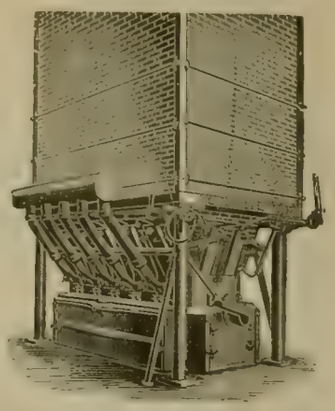
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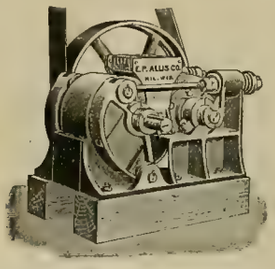
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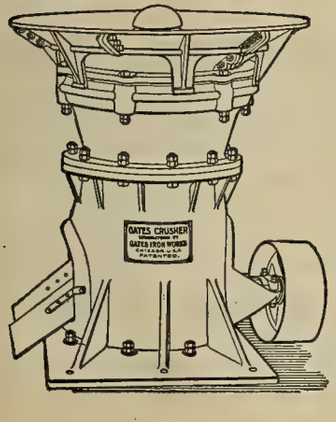
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Market Reports.

The Markets.

SAN FRANCISCO, March 11, 1897.

Business continues fair, with a steady increase in arrivals of merchants. They report roads in nearly all parts of the State almost impassable, which makes distribution slow. With clear weather for a few days travel will be better, when a large consumption demand is looked for. The feeling with the trade seems to be gaining strength that business this spring will be larger than for several years. With iron workers a good business is reported, chiefly on previous orders, although new work is being figured on. It is confidently expected that there will be an enlarged demand in structural and railroad materials and mining machinery and supplies.

The local money market continues to show a steadily growing ease. Idle money is coming out, which will make itself favorably felt within the next thirty days. The banks express more confidence in the future, which will cause them to put out more money. Gold coin sent from this city to New York from January 1, 1897, to March 1, aggregated over $8,000,000. Of this amount the United States Treasury sent $2,000,000. It is stated that there is more inquiry for funds on realty, but borrowers do not like to pay asking rates of interest, believing that a lower range will rule before long. The East reports general ease at all money centers. It is the belief that an improved demand for funds is near at hand. This opinion is grounded on all advices pointing to a larger business in all branches of trade, except luxuries, than for four years, which will necessarily call for more accommodations by manufacturers to meet the demand.

New York Silver Prices.

NEW YORK, March 11.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	29¾	64
Saturday	29 5-16	63⅞
Monday	29¼	63¾
Tuesday	29 3-16	63⅝
Wednesday	29¼	63⅞
Thursday	29 3-16	63⅝

	Copper.	Lead.	Iron.	Tin.
Friday	12 00	3 40	10 25@12 50	13 45
Saturday	12 00	3 40	10 25@12 50	13 45
Monday	12 00	3 40	10 25@12 50	13 45
Tuesday	12 00	3 40	10 25@12 50	13 40
Wednesday	12 00	3 40	10 25@12 50	13 40
Thursday	12 00	3 40	10 25@12 50	13 40

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	7½c Prem
New York Telegraphic Transfer	12½c Prem
London Bankers' 60 days	$4.86¾
London Merchants	$4.85
London Sight Bankers	$4.88¾
Refined Silver, per oz., 1000 fine	63⅝
Mexican Dollars	51

SILVER.—The market eased off still more the past week, closing barely steady. There is a light demand for India, which has its effect, while from other sources the call is only fair. A strong probability that Japan will adopt the gold standard has its effect also. The export movements from New York are not large, the drop evidently having interfered. The last steamer for China took out $265,700 of silver. For the first two months of the calendar year the export movement by water was $1,055,450.

MEXICAN DOLLARS.—The market has been quiet. The last China steamer took out 84,902 dollars. For the two months ending March 1st the shipments aggregate $1,242,911.

QUICKSILVER.—The market is fairly strong on this coast, at the East and abroad. The demand is said to be improving. For the first two months of the calendar year receipts at this port aggregate 2438 flasks, against 7689 flasks in the same time last year, and the exports aggregate 909 flasks this year, against 4504 last year.

Our market is quoted at $40 for domestic consumption.

BORAX.—The outward movement continues fairly free.

The market is quoted as follows:

Refined, in car lots	4¾
Refined, in sacks	5¼
Powdered, in car lots	5
Concentrated, "	4½

COPPER.—The market seems to be sustained at the East by force. With any easing up prices will have to go off. The opinion prevails that with the India demand improving, better prices will rule even in the face of an increased output. There is an absence of any speculative demand.

The local market is quoted as follows:

Ingot, jobbing	14½@—
Ingot, wholesale	—@13½
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17c

LEAD.—The market has held to firm figures. Eastern advices state that the demand continues good for the season of the year, in this country and in Europe.

Our market is quoted in jobbing lots as follows:

Pig	3 75	@	3 85
Bar	—	@	4 00
Sheet	—	@	5 25
Pipe	—	@	4 50

SHOT.—The demand is only moderately fair.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs			$1 20
Drop, B and larger sizes,	"	"	1 45
Buck, Balls and Chilled, do,	"	"	1 45

TIN.—For both pig and plate the market is quiet. The former is firm, but the latter is irregular owing to more or less cutting between American and foreign.

We quote as follows:

Pig, per lb	14¼c@—
Plate, I C coke, heavy, per box	$4 05@—
" " " light, "	3 95@—

IRON.—Pig is essentially unchanged. The imports of foreign continue free. The consumptive demand is light owing to considerable having been bought to arrive. At the East markets are reported unchanged. The consumption promises to exceed any former year. England fears the competition from this country.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—The demand is fair for all grades. The market is unchanged.

We quote as follows:

SPOT FROM YARD—PER TON.

Wellington	$8 00@— —
Greta	6 00@ 6 50
Nanaimo	6 50@ 7 00
Gilman	5 50@ 6 00
Seattle	5 50@ 6 00
Coos Bay	—@ 5 00
Cannel	8 00@— —
Egg, hard	12 00@13 00
Wallsend	— —@ 6 50

TO ARRIVE—CARGO LOTS.

Australian	5 50
Liverpool Steam	6 25
Scotch Splint	— —
Cardiff	6 25
Lehigh Lump	9 00
Cumberland	13 00
Egg, hard	10 00
West Hartley	6 50

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

ANTIMONY.—The market is steadier. Our market is quoted at 7⅛@8c in a jobbing way. New York mail advices quote 7½c for Cookson's, 6½@6⅝c for Hallett's and 6½c for Japanese.

POWDER.—The demand is strong. No change in prices is reported up to this writing. The market is quoted as follows:

Hercules, No. 1*, per pound	11¼c
" No. 2, " "	8¼c

NAILS.—The market is stiffening at the East and on this coast, with higher prices looked for.

Wire, carloads, basis per keg	
" jobbing, " "	$2 25
Cut, carloads, " "	
" jobbing, " "	2 10

SPELTER.—The market is fairly active both here and at the East.

We quote our market in a jobbing way at 5 cents a pound.

NICKEL ANODES.—The markets here and at the East are firmer.

PLATINUM.—Dealers report a fair inquiry. Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC.—The market is steady at quotations. Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady. We quote in jobbing lots at 50 cents per pound for ingots.

BISMUTH.—There is nothing new to report. At the East prices are firm.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is steady to firm.

We quote in a jobbing way at 70 to 75 cents per pound.

Chemicals.

There is a light movement from jobbers. The bad condition of interior roads is against much of a demand. As a rule, the markets here and at the East are firm.

BONEASH.—Manufacturers report a good movement.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is reported quiet but firm at 2½c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is quiet but steady at $1.70 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a fair demand at 2½c a pound from stores.

NITRATE OF SODA.—The market is easier. Eastern advices state that the demand is slacker and market easier.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is quiet at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported steady from store at 6½c per pound in carboys.

SULPHURIC ACID.—The demand is light. We quote in a jobbing way at 1½c per lb for 66%.

BLUE VITRIOL.—The Eastern markets are easier. Our market is steady, but dull.

We quote in a jobbing way at 4½c per pound.

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Alpha Con M & M Co, Nev	18	5c	Mar 2	Apr 5..Apr 27	C E Elliott, 309 Montgomery
Andes S M Co, Nev	43	10c	Feb 1	Mar 8..Mar 31	Jno W Twiggs, 309 Montgomery
Belcher S M Co, Nev	54	25c	Mar 2	Apr 6..Apr 27	C L Perkins, Mills Bldg
Best & Belcher M Co, Nev	61	25c	Jan 26	Mar 2..Mar 23	M Jaffe, 309 Montgomery
Con Cal & Va M Co, Nev	8	25c	Mar 8	Apr 13..May 3	A W Havens, 309 Montgomery
Confidence G M & M Co, Co	1	10c	Jan 19	Feb 27..Mar 20	F Aureguy, 320 Sansome
Con Imp M Co, Nev	38	1c	Feb 16	Mar 23..Apr 13	C L McCoy, Mills Bldg
Eureka Con Drift M Co, Cal	7	5c	Jan 20	Feb 26..Mar 20	D M Kent, 330 Pine
Eureka Con M Co, Nev	14	25c	Jan 18	Feb 23..Mar 15	H P Bush, 134 Market
Horseshoe Bar Con M Co, Cal	7	10c	Mar 8	Apr 17..May 8	D M Kent, 330 Pine
Jamison M Co	9	5c	Nov 27	Mar 26..May 21	Sam W Cheyney, 120 Sutter
Julia Con M Co, Nev	28	5c	Jan 21	Feb 26..Mar 19	J Stadtfeldt Jr, 309 Montgomery
Marguerite G M & M Co, Cal	5	10c	Jan 14	Feb 25..Apr 8	Chas Peach, 237 Twelfth
Mexican G & S M Co, Nev	56	20c	Mar 3	Apr 7..Apr 29	C E Elliott, 309 Montgomery
Mineral Hill M & S Co, Cal	1	5c	Jan 4	Feb 15..Apr 13	Chas Peach, 210 Sansome
Occidental Con M Co, Nev	26	10c	Feb 10	Mar 16..Apr 6	A K Durbrow, 309 Montgomery
Ophir S M Co, Nev	70	25c	Feb 5	Mar 10..Mar 30	E B Holmes, 309 Montgomery
Potosi M Co, Nev	47	20c	Mar 10	Apr 14..May 5	C E Elliott, 309 Montgomery
Reward G M Co, Cal	18	2c	Feb 6	Mar 11..Mar 27	S W Backus, Mills Bldg
Sierra Nevada S M Co, Nev	112	25c	Mar 2	Apr 6..Apr 26	E L Parker, 309 Montgomery
Thorpe M Co, Cal	5	5c	Jan 13	Mar 10..Mar 29	A F Frey, 44 Phelan Building
Troy M & D Co, Alaska	3	10c	Feb 2	Mar 9..Mar 26	O Kyst, 421 Mission

Mining Share Market.

SAN FRANCISCO, March 11, 1897.

The market has been devoid of interest. The depression that has ruled since January 1st last still continues. It seems to be a growing belief that there will be no change of a permanent character for some time to come. This does not indicate a belief that there will be up moves, but there will not be prices worth outsiders venturing in the market to try and get. Those who contend that there will not be much of a deal for some time to come base their opinion on reports that large moneyed men are not personally interested in the game, and without them neither a good sized or a fair sized deal can be made. They state that probable suits at law by discontents are a prime factor in keeping them out. They also state that under present conditions they would not give support to the market even if ore should be found in a mine in paying quantities. The attempt was made to galvanize the market into life on reported ore strike in Con. Virginia has failed, for operators do not find that experienced miners, not stock gambling operators, place confidence in the reports. Aside from that, an assessment even has more weight than reports of a small vein of ore. Even with this drawback, they may find more ore than indications warrant in expecting, which may enable stock manipulators to advance the shares sufficient to make shorts fill and also sell a few hundred shares to outsiders who stand in need of being left on a deal proposition. It is the growing impression that after the Legislature adjourns, and with money easy, an attempt will be made to advance prices to carry out the usual spring deal proposition. Assessments continue to be levied, for it takes money to run mines.

Official letters filed at the different offices in this city do not report any material change since our last week's issue. Work is being pushed as rapidly as possible considering the small number of miners at work. Several of the companies have more bosses and attaches than miners, which helps to give employment and, incidentally, "eat up" assessment money. The Utah letter reports fair work on the same level and in the same direction heretofore reported. The east crossdrift in Sierra Nevada from the north drift on the Layton tunnel level has struck water. This is considered favorable. The face shows porphyry, with seams of clay. In Union work is continued on the west crossdrift, and also east crossdrift on the 900-foot level. The formation is practically unchanged. Mexican letter reports that the face of the west crossdrift, 1000-foot level, is in hard porphyry, showing clay seams and soft vein matter on the bottom. In Ophir work is continued on the 1000-foot level westward and southward on the Central tunnel level. The Con. Virginia letter states that work is being done on the 1750-foot, 1650-foot, 1550-foot and 1000-foot levels. So far the sanguine expectations of bull pointers have not been realized, for the ore in the workings from 1550-foot level have narrowed instead of widened. On the 1650-foot mine floor, the first floor above the sill floor, the ore vein is 3 feet wide. The ore raised last week from all workings aggregated 68 tons, assaying $50.90 a ton. A north drift has been started by Best & Belcher and Gould & Curry from the 800-foot Bonner shaft level. In Savage the usual work is reported. Now that the Hale & Norcross election is over, unless more wrangling over law points should set in, it is to be hoped that the superintendent will be allowed to prosecute work more energetically. No work is being done in Chollar. Work is continued by Potosi from the tunnel level. They found $5 ore in the mine and a 20-cent assessment in the office. In Bullion and Alpha the work is on the same levels and directions heretofore reported. The letters from Con. Imperial, Confidence and Challenge do not report any particular change. The long west crossdrift is expected to strike the west lode some time in next month. Nothing is allowed to leak out from Yellow Jacket. The Crown Point letter does not report any material change. Silence continues the order regarding ore developments in Belcher and Seg. Belcher. Some ore is still raised, but from what level and character of work the letters do not report. Overman raised last week a few tons of ore from the 900-foot level. It assays over $50 a ton. In Caledonia work is continued on the 1100-foot level. From Alta nothing new comes to hand.

From the Brunswick lode our advices are slightly more encouraging. In Occidental they are working on the 550-foot, 750-foot and 850-foot levels. On the first and last levels they have struck ore. On the 550-foot it is 5 feet wide, assaying over $5, and on the 850 it is 2 feet wide, assaying $25 gold. Chollar has resumed shipping ore. The official letter reports 106 tons sent to mill, assaying $36 gold and 21 ounces silver to the ton. Exploiting work is being prosecuted on the 200-foot, 300-

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foot and 400-foot levels. On the 500-foot level they are pushing as fast as possible the south drift. The Savage, Gould & Curry and Best & Belcher letters do not report any change in work or material encountered.

The following illustrates the changes of the week:

MINES.	Mar. 4.	Mar. 11.
Alpha		
Alta Consolidated	$ 04	
Andes		
Belcher	18	
Best & Belcher	72	$ 77
Bodie		
Bullion	10	
Challenge	38	
Chollar		1 00
Confidence	95	
Consolidated California and Virginia	1 65	1 55
Consolidated New York		
Crown Point		
Exchequer		
Gould & Curry	34	35
Hale & Norcross	90	80
Justice		
Mexican	29	
Ophir	72	97
Overman		
Potosi	36	32
Savage	31	
Sierra Nevada		29
Union	29	32
Utah		05
Yellow Jacket	27	26

San Francisco Stock Board Sales.

SAN FRANCISCO, March 11, 1897.

9:30 A. M. SESSION.

200 Best & Belcher	77	50 Gould & Curry	35
500 Chollar	1 00	100 Ophir	97
100 Con Cal & Va	1 55	200 Sierra Nevada	29
1600 Con Imperial	01	100 Union	32

SECOND SESSION—2:30 P. M.

500 Best & Belcher	70	400 Sierra Nevada	27
300 Con Cal & Va	1 35	200 Utah	05
100 Chollar	91	500 Union	28
200 Potosi	32	100 Occidental	07
1000 H. & N	80	50 Standard	1 65
200 Yellow Jacket	26	25 Ophir	90
500 Con Imperial	01		

Rainfall and Temperature.

The following data for the week ending 5 A. M., March 10, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week	Total Seasonal Rainfall to Date	Total Seasonal Rainfall Last Year to Same Date	Average Seasonal Rainfall to Date	Maximum Temperature for the Week	Minimum Temperature for the Week
Eureka			32.01	32.78	56	36
Red Bluff	.61	22.46	14.53	20.02	60	38
Sacramento	.70	15.21	15.22	15.42	58	37
San Francisco	1.29	20.69	13.89	18.77	54	40
Fresno	.30	9.26	4.93	5.61	60	36
San Luis Obispo	1.04	19.71	14.61		62	34
Los Angeles	.60	16.05	7.87	16.34	62	40
San Diego	.52	10.88	5.68	8.52	60	44
Yuma	.44	5.31	0.88	2.67	72	42

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Assessment Notices.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 25th day of November, 1896, an assessment (No. 2), of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 25th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 24th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

MINERAL HILL MINING AND SMELTING CO.—Location of principal place of business, San Francisco, California; location of works, Spenceville, Nevada County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 4th day of January, 1897, an assessment (No. 1) of five cents (5c) per share was levied upon the whole of the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 210 Sansome street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 15th day of February, 1897, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 25th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

CHAS. PEACH, Secretary.

Office—210 Sansome street, San Francisco, California. Office hours from 1 to 3 o'clock P. M.

POSTPONEMENT.

At a meeting of the Board of Directors of the Mineral Hill Mining and Smelting Company, held on the 15th day of February, 1897, it was resolved that any stock upon which the assessment shall remain unpaid on the 15th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on TUESDAY, the 13th day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

CHAS. PEACH, Secretary.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 13th day of January, 1897, an assessment (No. 5) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of February, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors the date of delinquency of the above assessment is postponed to the 10th day of March, 1897, and the day of sale to MONDAY, the 29th day of March, 1897.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

ANDES SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia City, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of February, 1897, an assessment (No. 43) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 20 and 22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of March, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 31st day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Rooms 20 and 22, Nevada block, 309 Montgomery street, San Francisco, California.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Silver Star Mining District, Storey County, Nevada.

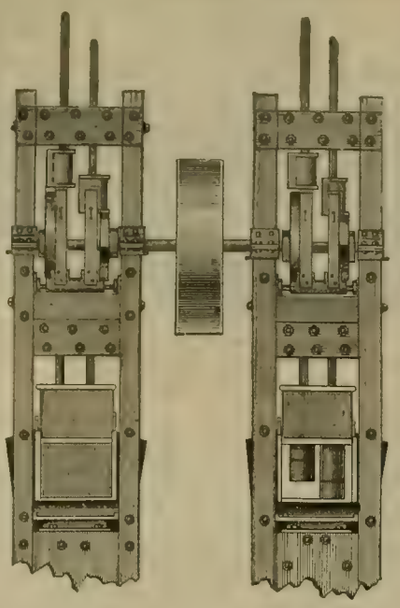
Notice is hereby given that at a meeting of the Board of Directors held on the 10th day of February, 1897, an assessment (No. 26) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 16th day of March, 1897, will be delinquent, and advertised for sale at public auction, and, unless payment is made before, will be sold on TUESDAY, the 6th day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED E. DUREROW, Secretary.

Office—Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.



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CONSOLIDATED CALIFORNIA AND VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the 8th day of March, 1897, an assessment (No. 8) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 47, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 3d day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room No. 47, Nevada block, No. 309 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

MARGUERITE GOLD MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 5) levied on the 14th day of January, 1897, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Julius Winkler	29	250	25 00
G. F. Deetken	82	1,000	100 00
Julius Winkler	96	500	50 00
Mrs. G. F. Deetken	190	600	60 00
Fred Deetken	237	1,000	100 00
Mrs. G. F. Deetken	239	400	40 00

And in accordance with law, and an order from the Board of Directors, made on the 14th day of January, 1897, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 237 Twelfth street, San Francisco, California, on THURSDAY, the 8th day of April, 1897, at the hour of 5:30 o'clock P. M. of said day, to pay said Delinquent Assessment thereon, together with costs of advertising and expenses of sale.

F. METTMANN, Secretary.

Office—237 Twelfth street, San Francisco, California.

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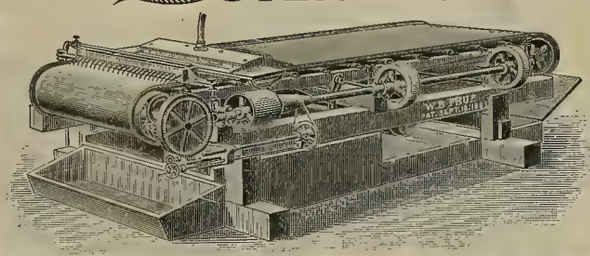
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It can be safely stated, without going into a description of several new and untried concentrators that have lately come into the market, that where sulphurets are of such value as to make close saving necessary, the Frue Vanner is always used. It is the only endless belt concentrator in the ma ket that can be relied on to handle all classes of ores, and give universal satisfaction. (In all competition of concentrators the Frue Vanner is taken as the standard machine of the world and all comparisons made by it. There have been over 4200 of these machines sold, 1700 having been sold on the Pacific coast alone.) They are in use in every part of the world where mining is carried on and in all cases they are giving perfect satisfaction. From time to time valuable and important improvements have been made in this machine to increase its capacity and durability, and particular attention is called to the Patent Lip Flange for the rubber belt, which does away with nearly all the strain and cracking, as in the old style of flange, making the life of belt more than double that of other style belts in the market. The lip of flange bends outward in going over the large end rolls, thereby distributing the strain in the solid rubber, and bringing virtually no strain either at the edge or at the base of flange, as is the case in all belts with a raised edge.

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RISDON IRON WORKS,

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READ WHAT MINERS THINK OF THE BRYAN PATENT ROLLER QUARTZ MILL AND JOHNSTON CONCENTRATOR.

OFFICE OF THE CANDELARIA CONSOLIDATED MEXICAN MINING CO.
SAN DIMAS, DURANGO, MEXICO, October 25, 1888.

RISDON IRON WORKS, San Francisco—Gentlemen: Our company has been operating three of the 4-foot Bryan Roller Quartz Mills, one of which has been running steadily for three years, one for two and one for one year. Our quartz is very hard; we crush through a No. 60 mesh screen. Our mills run 55 revolutions per minute, and each crush through 60-mesh screens 12 tons in 24 hours; through 50-mesh, 15 tons; and through 40 mesh, 18 tons. This proportion has been continuous.
One set of dies will crush from 1500 to 1600 tons.
One set of tires will crush 1500 tons.
One ring plate will crush from 2200 to 2300 tons.
The mills require very little attention. At our mill an ordinary "peon," earning one dollar per day, has complete charge.
In regard to sliming, in comparison with stamps, by reason of the discharge surface and the continuous agitation by the scrapers, a MUCH less amount of slime is created. A three years' experience teaches me that, in every respect, the mills are a complete success, and of material benefit to the mining world. They can be set up and running in forty-eight hours and can be dismounted in the same time and removed to wherever desired. Ours were packed on our mule trail over as difficult a road as any in Mexico. As a gold amalgamator it is unequaled by any mill now in existence. Yours truly,
D. M. BURNS, Superintendent.

BULLION-BECK AND CHAMPION MINING COMPANY.
EUREKA, UTAH, August 24, 1895.

THE RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: Referring to contract made by you with the Bullion-Beck and Champion Mining Company, by which you were to furnish one 5-foot Bryan Roller Quartz Mill on four months' trial, in competition with the Huntington Mill, would say that we have made the test, and the Bryan Mill has proven so greatly superior on all points claimed, viz., capacity and economy, that we have ordered a second Bryan Mill from you and have concluded to discontinue the use of the Huntington Mill.
Yours truly, JOHN BECK, Pres.
SIMON BAMBERGER, Director. [Copy.] W. J. BEATIE, Sec't'y.

BULLION-BECK AND CHAMPION MINING COMPANY.
EUREKA, UTAH, Aug. 24, 1895.

THE RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: In February last, in connection with the five-foot Bryan Roller Mill which we took from you to test in competition with the Huntington Mill, we also took a six-foot Johnston Concentrator to be tested with ten Frues, one end shake with four belts and one side shake Woodbury. We have been working these machines since the mill was completed, at such times when we had sufficient water.
The terms on which the test was made was that the machine doing the most satisfactory work should be accepted and the others taken out. This did not apply to the Frue, as they were purchased with the plant. In compliance with this agreement, we now inform you that the Johnston Concentrator has proved so superior over the other machines that we now order from you four more of the Johnston Concentrators. Yours truly, JOHN BECK, Pres.
SIMON BAMBERGER, Director. W. J. BEATIE, Sec't'y.

GREAT SALT LAKE AND HOT SPRINGS RAILWAY.
S. BAMBERGER, President and Manager.
SALT LAKE CITY, UTAH, October 10, 1895.

B. R. TAWNDRAW, ESQ., care Guyer Hot Springs, Ketchum, Idaho—Dear Sir: In reply to yours of the twenty-eighth of September, we have been using at the Bullion-Beck Concentrating Works, Frue Vanner, Woodbury and Johnston machines, side by side for the last four months; and after a thorough trial of all of them, we concluded that the Johnston Vanner was doing the most accurate work and was the best; hence, we bought four more Johnston machines and shall continue to use them in preference to any other.
You will find it the easiest regulated machine and very much easier set up than either of the other machines. We bought our machines from the Risdon Iron Works, of San Francisco, where Mr. Johnston, the patentee, personally superintends the manufacturing of them.
Hoping you will make a success, I remain, Yours truly,
[Copy.] [Signed] SIMON BAMBERGER.

THE GOLD VALLEY MINING COMPANY OF SAN FRANCISCO.
C. C. MCIVER, President; D. CUSHMAN, Secretary.
MISSION SAN JOSE, CAL., Oct. 17th, 1895.

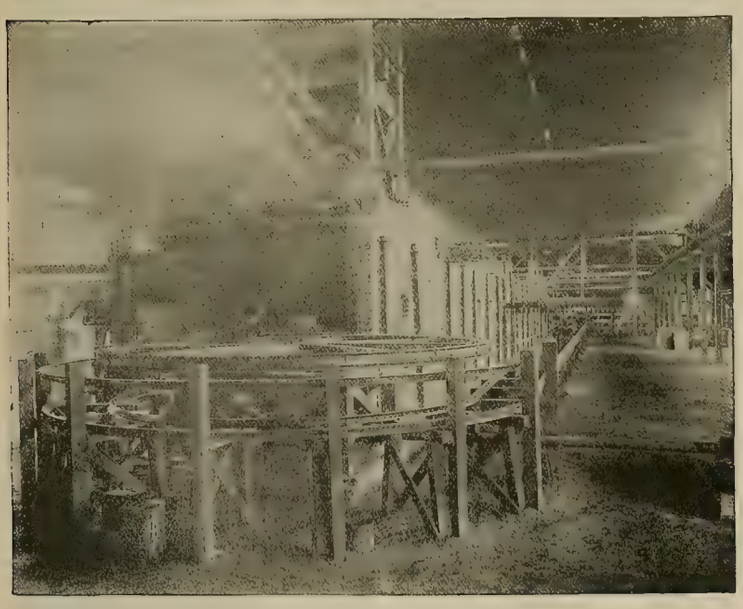
RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: We take great pleasure in having to inform you that, after a careful investigation extending over a six weeks' steady run alongside of six other concentrators, the Johnston which you put in for us was the only machine from which you could not find a loss in the tailings. It has done all you claim for it and has proved more than satisfactory. We intend replacing all our other concentrators with Johnston's, as we are convinced they will pay for themselves many times over in a year. CHAS. C. MCIVER, President.

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FOR ROASTING, CHLORINATING AND DESULPHURIZING ORES.

Extracts from Letters Received from Mr. Philip Argall, Manager the Metallic Extraction Co., Cyanide, Colorado:

January 2, 1897.
"The roasting is invariably good. We can do 80 tons per day to 0.13% sulphur, when everything runs smooth. Our month record which, of course, includes all delays, is 1700 tons, from 1.94% sulphur to 0.16%."

February 19, 1897.
"Our furnace is now running very nicely indeed, averaging 90 tons per day to 0.10% sulphur, and doing excellent work; in fact, it has improved right along and we are highly pleased with it.
"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

The ROPP FURNACE is now is successful operation at the following reduction works: The Hanauer Smelting Works, Salt Lake City, Utah (one furnace); The Metallic Extraction Co., Cyanide, Colo. (one furnace); The Colorado-Philadelphia Reduction Co., Colorado City, Colo. (three furnaces); The Selby Smelting & Lead Co., Selby, Cal; (one furnace); The Mount Morgan Gold Mining Co., Rockhampton, Queensland (one furnace); and Broken Hill Proprietary Co., Broken Hill, New South Wales (two furnaces).

Catalogue on Application.

Cal State Library 1897

MINE BELL SIGNALS. Adopted, Used and in Force in Accordance with State Law.

FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 220 Market St., San Francisco.

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 1915.—VOLUME LXXIV. Number 12. SAN FRANCISCO, SATURDAY, MARCH 20, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

CALIFORNIA STATE LIBRARY

Extravagance in Road Work.

Considerable has recently been said in these columns regarding the need of good roads in California. It is to be borne in mind that a large amount of money is annually expended for "road work" in the various counties—one man writes that in his county 45 per cent of the taxes collected are so expended—but it sometimes happens that that money is not wisely or judiciously spent.

Herewith is illustrated two striking instances of extravagance in road making. The lower picture shows a plank culvert which looks economical, but is really a tax-consuming device. Substructures of perishable material are always extravagant, though the first cost has an economical look on paper. They consume a large amount of timber and afford opportunity for a large amount of wage paying. Every time a plank gives out a whole lot of county machinery is set at work and the cost of repairs is enormous. A case has been cited in which a man and team were sent to put a plank in a bridge a few miles distant. He started out leisurely in the morning, got a plank from a lumber yard and proceeded to the broken bridge four or five miles away. Arriving about lunch time, he ate his lunch and then unloaded the plank. He found that he had bought a 12-inch plank instead of a 10-inch, and was forced to leave the misfit plank in the gap and return to town. As it was too late in the day to return he unhitched and turned in for the night. The next morning he went again to the lumber yard and got a plank of the right width and started again for the broken bridge. Arriving there he found that some one had stolen the loose plank which he left in the gap, but he succeeded in nailing down the new one and got back to town that night. When the bill came in against the county it of course included the cost of two planks and two days' time of man and team to put one plank in a bridge—a job which should have been done in half a day. All perishable substructures are likely be very expensive in this way, and that is the reason why permanent, imperishable structures are so cheap in the end. The plank culvert shown in the engraving will require constant patching and renewal, and will therefore in a few years cost many times as much as a cement and glazed sewer-pipe culvert would.



INSTANCE OF MONEY WASTED IN BUILDING MAKESHFIT ROADS.

The upper picture on this page is just as eloquent in its way. It represents the construction of a roadway over a lava plain in Tehama county. The plan has been to roll the rocks to one side and thus clear a way, but the material beneath was of such nature that the roadway soon became dangerous and almost impassable. Five times, therefore, new roads were arranged to take the place of those worn out, and the picture shows four of these abandoned roadways Last year, on advice of the Bureau of Highways, the people undertook to build a macadamized road of the rock which lay all around. There was no public money available, so one man advanced the money to buy a rock crusher, the neighbors subscribed 1000 days' labor of themselves and teams, others subscribed food and provender for man and beast while the work was in progress, and the result is the macadamized road of which a portion is shown at the extreme right of the picture. It has cost less than did the five worn-out roads and it will last for a lifetime with a little care and watchfulness. It was a hard place to build a road, for there was no soil into which excavation could be made to hold the broken rock in place, but by piling up the loose rocks on each side, and making a crushed rock roadway between these retaining lines of large rock, the difficulty has been overcome. This, too, shows how a good job will be a permanent improvement and thus enter into the actual wealth and resources of the county, while a poor road is not only expensive but but represents no investment at all, because it has no durability or permanence in it.



TYPE OF CULVERT WHICH IS OF ENDLESS EXPENSE TO THE COUNTY.

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J. F. HALLORAN.....General Manager

San Francisco, March 20, 1897.

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The Debris and Dredger Bills.

The debris and dredger bills have been passed by the Legislature of California and signed by the Governor. There was, of course, no expectation that the debris bill would fail of passage, for it was designed merely to correct the bill by which $250,000 was appropriated in 1892, to be expended in conjunction with another $250,000 appropriated by Congress for building restraining dams under the direction of the United States engineers. That this money will be wisely and well spent there can be little doubt, simply because the direction of the works to be undertaken is put almost entirely in the hands of the United States Debris Commissioners. The California Legislature has never made a wiser investment than this. Had Congress not been induced to make its appropriation, and had the State's $250,000 been expended under the direction of Commissioners appointed by the Governor, with an eye to the good of his party or his own political future, little good would probably have been done. As it is, no matter what appointments may be made by the Governor or how much it is attempted to do politics with the money appropriated, the United States engineers will go on and expend it in a business-like way. There will be no scandals connected with the debris appropriations.

The dredger bill as first passed by the Senate and Assembly provided for the expenditure of $300,000 in dredging and straightening the channel of the Sacramento river. The amount, properly expended, would not be more than would be required for the good work that could be done in two years. However, the Governor, desirous of making a name for economy, called into conference the champions of the measure and forced them to accept a modified bill, by which the first year's levy should be only one-quarter of a cent—making about $30,000, and the second year's only one-half a cent—amounting to $60,000, leaving the rest of the appropriation to be collected thereafter.

It was suggested in the MINING AND SCIENTIFIC PRESS early in the session that, upon proper presentation of the case, Congress could easily be induced to make an appropriation for improving the Sacramento at least equal to that made by the State to be expended at the same time. As it is, it will now be at least a year before the State can do much or expend a large part of the money intended for the purpose, and it is to be hoped that at the next session of Congress some steps will be taken to induce the Federal government to join in the work. The opening of the Sacramento river to navigation and its preservation for that purpose is not the province of the State, but of the Federal government. Yet, as was said in these columns a few months ago, the expenditure of money by the State on the river will probably be a good investment, in that it will induce the Federal government to do much more than it would otherwise.

It is to be hoped, too, that the Federal government will come in before any large proportion of the amount intended to be expended by the dredger bill is paid out. That in the end most of the work of improving the Sacramento river will be done by the Federal government there can be no question, and it will be much better if what has been appropriated by the State be expended in such manner as to be of value and in accordance with the views of United States engineers. Otherwise it is apt to be wasted.

The New Law as to Locations.

The new mining law as to locating upon the public domain, which has passed the Legislature of California, contains some desirable provisions, but is in other respects far short of what is wanted. Its provisions are as follows:

The discoverer of any vein or lode shall immediately, upon making a discovery, erect at the point of discovery a substantial monument, or mound of rocks, and post thereon a preliminary notice which shall contain the name of the lode or claim; the name of the locator or locators; the date of discovery; the length, width and general course of the vein, and a statement that the notice is a first or preliminary notice. Such notice shall be recorded in the office of the County Recorder of the county in which the same is posted within twenty days after the posting thereof. Upon the erection of said monument and posting such notice, the discoverer shall be allowed the period of time specified in Section 3 of this Act to enable him to perfect his location as hereinafter provided.

SEC. 3. Within sixty days from the date of the discovery of a vein or lode, the discoverer must perform fifty dollars' worth of labor in developing his discovery, and mark his location on the ground so that its boundaries can be readily traced, and must file in the office of the County Recorder of the county in which the claim is situated a certificate of location, which said certificate shall state:

1. The name of the lode or claim.
2. The name of the locator or locators.
3. The date of discovery and posting of notice, provided for in Section 2 of this act, which shall be considered as the date of the location.
4. A description of the claim, defining the exterior boundaries as they are marked upon the ground, and such additional description by reference to some natural objects, or permanent monument, as will identify the claim.
5. A statement that such certificate is final or completed notice of location, and that he has performed the aforesaid fifty dollars' worth of labor in development work thereon within the aforesaid sixty-day period, stating generally the nature thereof. Said certificate shall be dated and signed by or on behalf of the locator or locators, and verified by them or by some one in their behalf, and when filed for record shall be deemed and considered as prima facie evidence of the facts therein recited. A copy of such certificate of location, certified by the County Recorder, shall be admitted in evidence in all actions or proceedings with the same effect as the original. The performance of such labor shall be deemed a necessary act in completing such location and a part thereof, and no part thereof shall inure to the benefit of any subsequent location.

SEC. 4. The discoverer of placers or other forms of deposit, subject to location and appropriation under mining laws applicable to placers, shall locate his claim in the following manner:

First—He must immediately post in a conspicuous place at the point of discovery thereon a notice or certificate of location thereof containing:

(*a*) The name of the claim.

(*b*) The name of the locator or locators.

(*c*) The date of discovery and posting of the notice, hereinbefore provided for, which shall be considered as the date of the location.

(*d*) A description of the claim by reference to legal subdivisions of sections, if the location is made in conformity with the public surveys; otherwise, a description with reference to some natural object or permanent monument as will identify the claim, and where such claim is located by legal subdivisions of the public surveys such location shall, notwithstanding that fact, be marked by the locator upon the ground, the same as other locations.

Second—Within thirty days from the date of such discovery he must record such notice or certificate of location in the office of the County Recorder of the county in which such discovery is made, and so distinctly mark his location on the ground that its boundaries can be readily traced.

Third—Within sixty days from the date of the discovery the discoverer shall perform labor upon such location or claim in developing the same to an amount which shall be equivalent in the aggregate to at least ten dollars' ($10) worth of such labor for each twenty acres, or fractional part thereof, contained in such location or claim.

A failure to perform such labor within said time shall cause all rights under such location to be forfeited, and the land discovered thereby shall at once be open to location by qualified locators other than the preceding locators, but shall not in any event be open to location by such preceding locators, and any labor performed by them thereon shall not inure to the benefit of any subsequent locator thereof.

Fifth—Such locator shall, upon the performance of such labor, file with the recorder of the county an affidavit showing such performance, and generally the nature and kind of work so done.

SEC. 5. The affidavit provided for in the last section, and the aforesaid placer notice or certificate of location when filed for location, shall be deemed and considered as *prima facie* evidence of the facts therein recited. A copy of such certificate, notice or affidavit, certified by the County Recorder, shall be admitted in evidence in all actions or proceedings with the same effect as the original.

SEC. 6. All locations of quartz or placer formations or deposits, hereafter made, which do not conform to the requirements of this act, in so far as the same are respectively applicable thereto shall be void.

SEC. 7. No record of a mining claim or mill site made after the passage of this act, in the records of any mining district, shall be valid. All notices of location of mining claims, mill sites, and other notices, heretofore recorded in such district records, if such notices conform to the local rules and regulations in force in such district, are hereby declared valid. Within thirty days after the passage of this act the District Recorder or custodian of the records of the several mining districts in this State, shall transmit to the County Recorders of the respective counties wherein the respective districts are situated, all the records of said respective districts, and thenceforward such County Recorder shall be deemed and considered the legal custodian of such records. Thereafter copies of such records, certified by the County Recorder, may be received in evidence with the same effect as the originals.

The two things most needed in the mining law of this State were some definition as to what shall constitute a proper marking and some provision for preventing people from evading the spirit of the United States statute requiring assessment work to be done and so holding claims without doing anything to develop them. As to this last, the bill makes full provision, but as to what shall constitute a proper marking the bill is silent, and those who wish to locate mines will still be as much in the dark as ever as to what monuments they shall erect, and this fruitful source of litigation will still remain.

California School Lands.

Very late in the session of the California Legislature Senator Stratton introduced a bill providing for the repeal of the acts of March 28, 1874, February 3, 1876, and April 6, 1880, providing for the sale of mineral land in school sections 16 and 36, granted to the State by the Federal government. In spite of the short time allowed and the opposition that was brought to bear by parties in interest, the bill has been passed and has gone to the Governor for his signature.

This will be of particular interest to people in the Rand district in Kern county, from which place less than nineteen applications for patents for forty acres each have been filed with the Attorney General under the acts referred to, and which have been declared by the United States Supreme Court void.

THERE is being mooted the question whether or not mineral claims may be located within the boundaries of the forest reserves, recently set apart by presidential proclamation. If they may, or if it is the desire of the Government that this shall be allowed, the question should be speedily settled by Congressional enactment at this special session. A delay can only lead to confusion, and the miners are already overburdened with that in respect to the laws.

Concentrates.

ROSSLAND, B. C., proposes to organize a mining exchange.

MERCUR, UTAH, will be lighted with electricity by the first of May.

THE shipments from Bingham, Utah, in February amounted to 3952 tons of ore.

LUMBER costs $142 a thousand at the mines near Coolgardie, Western Australia.

A COMPANY has been formed to work the mica mines in Latah county, Idaho.

THE new owners of the Edna mine in Calaveras county, Cal., propose to erect a four-stamp mill.

IT is announced that metallic tin has been discovered near the north fork of the Salmon river in British Columbia.

AT the Dead Horse mine in Tuolumne county, California, the shaft, which is 1500 feet deep, is to be sunk another 500.

IT is proposed by some Alaskans to drive 200 head of cattle overland from Seattle, Wash., into the Yukon country by the Dalton trail and Chilkat pass.

THE Good Will tunnel, at Cripple Creek, Colo., which is in a distance of over 800 feet, was cut 318 feet in 28 days in February, an average of 11.35 feet a day.

THE London & Cripple Creek Company has completed its cyanide plant at Florence, Colorado, at an expense of $100,000, and is working in Cripple Creek ores.

THERE were thirty-nine claims recorded in the office of the Recorder of the Rand mining district, in Kern county, California, for the week ending March 12.

AT Marcus, Idaho, the owners of the Sunnyside group of mines have incorporated their properties and will soon start a tunnel 3000 feet in length to tap their claims.

A WORKMAN in digging a cellar at Salmo, on the Salmon river in British Columbia, last week, found a $10-nugget, and over 100 claims have been staked out since then.

THE bill introduced by Assemblyman Robinson of Nevada providing for the appointment of a State mining inspector has passed both houses of the California legislature.

THE mines of the United States of Colombia have, it is estimated, yielded in gold since the emancipation from Spain $700,000,000. Nearly every state and province has its gold deposits.

TWO MINING operators from Australia came over in the Miowera on her last trip, bound for the British Columbia mines, and state that many other miners are preparing to come over.

THE Mica Manufacturing Company, limited, is being floated in London at £80,000. It is formed to acquire and work the Lake Girard group of mica mines, consisting of 1700 acres, in Ontario, Canada.

IN Siskiyou Co., Cal., it is claimed that there is at least a third more mining done this season than there was last. A good supply of water promised for the gravel mines will add much to the total output.

CAPTAIN HALL, superintendent of the Le Roi mine at Rossland, B. C., states that when the new hoisting apparatus is in and the compressor drills all started he will be able to get out 1000 tons of ore a day.

THE Union Colliery Company, of Comox, B. C., has entered into contract with the Kootenay smelting companies to supply 1000 tons of Union coke per month for the next twelve months, and this amount may be increased.

THE Maltman & Thompson chlorination works at Grass Valley, Cal., were burned last Saturday morning. They were built in '87 and operated successfully until twelve months ago. The loss is estimated at $12,000.

THE people of Forest City, Sierra county, propose to buy the electric plant lately used by the Bald Mountain Extension Company to illuminate the town. Downieville and Sierra City are already supplied with electric light.

UP to March 6, the total value of ore and matte shipped from the Kootenay country since the first of the year was $1,658,400.05. The total for the week ending March 6 was $261,224.80. This all shows a large increase over last year.

THERE is not a county in the State of Wyoming that is not underlaid with coal to a greater or less extent. In this industry over 4000 men are employed, producing annually 2,500,000 tons of coal, valued at the mine at over $4,000,000.

THE De Lamar mine in Lincoln county, Nevada, has been started up again, the men and the management having arrived at an understanding by which there will be no danger of strikes. The output of the mine is nearly 300 tons daily.

THE February cleanup of the Alaska-Treadwell G. M. Co., Alaska, resulted as follows: Bullion shipment, $38,189; ore milled, 19,154 tons; sulphurets treated, 430 tons; bullion from sulphurets, $13.353; average cost of the bullion was $1.99 per ton of ore milled.

A CONTRACT for machinery castings and for a 200-stamp mill to be erected by the Union Hill Mining Company in Galena, South Dakota, has been awarded. This new company has on its pay roll 200 men, and their proposed work promises to add much to the output of the Black Hills.

THERE is considerable excitement in Ventura County, California, over a gold discovery made in Ojai valley. Hundreds of locations have been made, and the mountains are full of prospectors. The discovery as reported is of a ledge carrying comparatively low-grade ore.

DOUGLAS J. NEAME, of London, England, has obtained options on the Commander, Jumbo and Gertrude mines, at Rossland, British Columbia, the prices aggregating $875,000, of which $250,000 is for the Commander, $500,000 for the Jumbo, and $125,000 for the Gertrude.

THE Toronto *World* states that the Gooderham-Blackstock syndicate, which lately bought the War Eagle mine in British Columbia for about $800,000, had an offer from a London syndicate of $2,475,000. It is more likely that the London promoters offer about $1,000,000 and reserve the balance of $1,475,000 to pay for promoting.

THE Boston & Montana Consolidated Copper and Silver Mining Company, of Montana, has begun an action in the United States court to recover half a million dollars from the Montana Ore Purchasing Company, E. Augustus Heinze and A. P. Heinze, the alleged value of ores extracted from the Pennsylvania by the defendants.

DURING the month of February there were shipped from the Black Hawk depot, in Colorado, 287 cars of mineral, representing the product of the district for that month, aggregating 4592 tons. Compared with the corresponding month of 1896 this shows an increased shipment of 102 cars, or 1632 tons of mineral, or an increase of over 50 per cent.

THE Leadville strike has been declared off by the miners. The struggle has been a long and hard one and has entailed heavy losses on all concerned. It is claimed that the loss to the camp has been no less than $4,000,000, and the maintenance of the troops has added much to the taxation of the State.

THE Governor of California has signed Assemblyman Seward's bill providing that unoccupied town lots in Government townsites shall be open to mineral claims, and the same member's bill permitting claims without acknowledgment or certificate of acknowledgment, and validating all notices heretofore filed without such.

THE Legislature of the State of Washington has lately passed bills to prevent the defacement, mutilation or destruction of miners' location stakes or notices and providing penalty clause; extending the right of eminent domain to mining and milling companies; appointing an inspector of coal mines for the protection of coal miners.

THE Canadian Pacific Railway, in its annual report, announces that the building of the Crow's Nest Pass line will be proceeded with as soon as weather will permit, whether assistance is received from the Canadian Government or not. This will do British Columbia mining districts much good in increasing facilities for shipping.

IN the John Day country there is considerable activity in placer mining. Ditches built as far back as 1862 have been opened, and old claims are being once more profitably worked. Many of these are being worked with the various patterns of gold-saving machines, with good results. Considerable capital is going in, and several mines are to be fitted up on large scales.

THE appropriation bill passed by Congress provides for $15,000 for continuing explorations of the waters of Alaska and making hydrographic surveys, including survey of the Alautian islands and examination of the mouth of the Yukon river, and for the establishment of latitude, longitude and magnetic stations. Also, $5000 for continuation of the investigation of the coal and gold resources of Alaska.

JULIAN SONNTAG has tendered to President Neff his resignation as secretary of the California Miners' Association. Mr. Sonntag has done good work during the past winter in connection with the mining legislation at Sacramento, and finds that too much of his time has been taken from his own business. Since he accepted the position, about eighteen months ago, Mr. Sonntag has never accepted the salary of $50 a month attached to the office.

THE Nevada Legislature has passed an act providing that all State deeds or patents to lands shall contain a provision expressly reserving all mines that may exist in such land, and the State disclaims any interest in mineral lands selected by the State on account of any grant from the United States. This act is to prevent all controversy regarding the title to mining claims discovered upon lands selected by the State and disposed of to settlers or speculators.

THE ancient Athenians who smelted galena at Laurium did not trouble themselves about the lead contents of their slags, and, consequently, at the present date it pays to smelt them. Some of these slags, rich in lead, have been exposed to the action of sea water, and from the resulting decomposition some new crystalline lead compounds have been formed. According to A. Lacroix, these crystals are sometimes of considerable size, and consist of laurionite, penfieldite, matlockite, cerussite, hydro-cerussite and anglesite.

A NEW company will begin work about May first on the proposed Pandora tunnel, to run from Pandora to the Telluride mine in Colorado, a distance of 7000 feet. It will cut the southeast extension of the Smuggler-Union vein, the Columbia-Menona and Bradley and Pioneer, Eight-five, Argentine and Big Elephant, Japan, Flora, Climax, and finally the Big Elephant. All these leads will be cut at a depth of from 2000 to 3000 feet below the surface.

AT the Zelnora mine at Bingham, Utah, they are testing water seeping from one of the copper veins in the main canyon with the purpose, if results are favorable, of establishing a precipitating plant. Several years ago Prof. Hirsching of Salt Lake estimated that two tons of copper are carried away by the water of Bingham creek every twenty-four hours, and that a process might be operated which would precipitate the metal at the nominal expense of $2.50 a ton.

THE first sluice box ever operated in Alaska is claimed to have been one put in by Duncan McKinnon at Shuck in 1870. The boxes were carried about a mile and a half from the beach by Indians at an expense to Mr. McKinnon of $17, and were very crudely put into position and charged with quicksilver and shoveled full of dirt on which the water was then turned, the process being continued for three days. A clean-up at the end of that time yielded a button weighing $7.50.

THE Douglas mill and reduction works, at Dayton, Nevada, have been leased by the Peck Brothers, who, as heretofore announced, have purchased the Douglas ore tailings deposit east of the mouth of Six-mile canyon. The Peck process will be adopted in working them. The deposit contains over 500,000 tons which it is claimed show an average assay value of $7. The narrow-gauge road from Dayton to the deposit will be repaired, and it is claimed that 500 tons a day will be worked.

IN the Camp Floyd mining district, Utah, there will in all probability be five large mills erected as soon as the weather will permit. These will be in the Gold Dust, Brickyard, Overland, La Cigale and Daisy properties. It is also probable that a large mill will be erected this year on the Golden Gate, and at Mercur the plants at the Mercur, Marion and Geyser will be enlarged. Besides this, the mill at the Sunshine will be started up, and it is probable that the output of the camp will be nearly doubled.

IT is reported from Boston, Mass., that a German syndicate has invested some $20,000,000 in Montana copper mine stocks and secured control of some of the largest mines, including the Boston & Montana and Butte & Boston mines. Then the Boston News Bureau says that the Rothschilds are trying to buy the Calumet & Hecla, the Tamarack, Butte & Boston and Boston & Montana properties, and corroborates the story which has been going the rounds of the press to the effect that Butte & Boston stock amounting to $1,800,000 has been transferred to foreigners.

SECRETARY JULIAN SONNTAG states that the treasury of the California Miners' Association is empty, and asks that the various county organizations now far behind in their dues come forward. While there is no need for much money for present expenses, there is money due for the expenses of the past winter, which have necessarily been heavy. The good work of the Association should not be hampered for want of the comparatively small sums due from the branch organizations.

THE New Mexico Miners' Association was organized last week at Santa Fe. The by-laws and constitution of the California Miners' Association were adopted. Antonio Joseph of Taos and F. A. Geynolds of Chloride were elected president and secretary, respectively. It was stated that the object is to unite mine owners and capitalists interested in New Mexico against the Western Federation of Miners, which has so long flourished at Leadville, Cripple Creek and other camps in Colorado.

A MEETING of the shareholders of the Banner Gold Mine, whose properties are in Butte county, California, was held in London on February 24, to reconstitute the company. The chairman explained that it was proposed to amalgamate the Long's Bar Gold Mine, Clark Gold Mine, Coffee Gold Mine, and the Hedge's Gold Placer and Quartz Mine with the Banner and Amvaky Mine under the name of the Consolidated Gold Mines of California. The shares in the new company would be issued with a liability of 3s. The scheme was adopted.

NEW YORK people have purchased for $80,000 gravel property in Wyoming, consisting of 1920 acres of placer ground, which averages from 3 to 5 feet in depth. This gravel is a lacustrine deposit from granite and very easy to wash, containing very few boulders, and those small in size. The gold, however, is very fine in all that country in southern Wyoming and northwestern Colorado, averaging in many deposits 1000 nuggets to 1 cent. However, it is not flaky, but in the shape of small nuggets, and comparatively easy to save with proper appliances.

THE Pioche *Record*, in speaking of the old Ely district, says that there are as good opportunities there now for mining as ever. While the ore is not of as high grade as formerly, the prices and costs of working have been reduced enough to give a greater profit. The paper says: "The charges of hauling from the mines to the railroad have fallen a trifle lower than 60 per cent of what they were at the time this district was flourishing, while the charges on the railroad to the smelters have been reduced to a trifle less than one-half, and the smelting charges have fallen or been reduced in a like proportion."

AT the first meeting of the Board of Trustees of the American Flat Company at Virginia City last week, after the election of officers, W. E. Sharon, H. M. Gorham and E. D. Doyle were appointed a committee to negotiate an agreement with the Comstock Tunnel Company for the purpose of securing their assistance in constructing a tunnel from the shaft of the Alta Mining Company, to drain the Comstock lode, connecting with the tunnel from the Alta shaft to the Sutro tunnel at the Foreman shaft, and A. Lackey, E. D. Boyle and J. R. Ryan a committee to negotiate with owners of claims upon the Comstock lode for the conveyance of undivided portions of such claims to the company.

IN the Cœur d'Alene country, at the Bunker Hill and Sullivan property, they will soon continue the big tunnel which was commenced in 1890 by D. A. Clement, who was the manager of the property. It had been run between 500 and 600 feet at the time of the troubles in that section, and the work has not been continued since that time. This will be the greatest work in the district, and the tunnel when completed will be one and a half miles long, and at one mile will tap the big vein running through that section, and will drain all the mines between Kellogg and the Tyler. John Hays Hammond, who retains his interests in the properties, is expected to come out to the mines on his return from South Africa.

AT the examination of Cecil Rhodes by the parliamentary committee appointed to enquire into the Jameson raid into the Transvaal, it appeared that the fines imposed upon the members of the Reform Committee were in part paid by him. Mr. Rhodes stated that he had sold 40,000 shares of the South Africa Company stock to pay the expenses of the war against the Matabeles, and had expended £94,000 in that. He further testified that he had paid £50,000 toward the fines which had been imposed by the Transvaal court at Pretoria upon the Johannesburg reform committee prisoners. The questions put and answers given showed that the narrow and reactionary policy of the Transvaal Government is endangering the peace of South Africa.

FROM the Slocan mines, owned by Farrell, Yawkey and Humphreys, the Idaho, Alamo, Cumberland and the Minnesota Silver, of the Ivanhoe group, the smelter returns up to January 1 of the present year show that the Idaho has produced ore to the value of $236,000; the Alamo, $186,000; the Cumberland, $12,000; and the Minnesota Silver, $42,000—a total of $476,000. The general average of crude ore and concentrates from the Idaho during the life of the mine has been 152 ounces of silver and 50 per cent lead. The highest smelter returns from any ore shipment was 636 ounces of silver. The average concentration of the different properties is as follows: Idaho, 4 tons to 1; Alamo, 3.8 tons to 1; Cumberland, 3.9 tons to 1.

THE powder war has been brought to a close by an arrangement between the Atlantic and Pacific coast companies. The Eastern companies are to keep out of the coast field and vice versa, but between the two is a neutral ground including New Mexico, Colorado, Montana, Utah and Wyoming. It is open to both parties, who have agreed to advance prices from 1 cent to 1½ cents on both black powder and high explosives. The California, Judson and Giant companies have an agreement as to their territory—Washington, Oregon, California, Nevada, Arizona and Idaho—in which the advances will be higher than in the neutral belt, and will be about 2 cents a pound. It is understood that a powder factory will be started in Denver, Colorado.

THERE has been passed over the Governor's veto in Utah a new mining bill as to locations and titles to mining claims. The main objection to the bill was that it provided that all locations must be recorded with the county recorder, as well as the district recorder, thus practically doing away with the necessity for the district recorders. In other respects the bill is practically the same as that proposed for adoption by the California Legislature in the MINING AND SCIENTIFIC PRESS of October 31, 1896. As to marking boundaries, it prescribes that on a location of a quartz claim there must be erected in each corner thereof, and at any angle in the side line, a monument marked with the name of the claim and the corner or angle it represents.

Outline of the Geology of California with Reference to Its Mineral Deposits.

NUMBER VI.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by HAROLD W. FAIRBANKS, Ph. D

The important event of economic importance in the Coast ranges connected with the volcanic eruptions was the inauguration of the flow of numerous hot springs impregnated with silica, sulphur, cinnabar and occasionally gold. The cinnabar deposits are among the most important of the mineral resources of the State. They are traceable directly to the volcanic disturbances mentioned. Cinnabar is one of the most recently formed minerals. In several places, as Sulphur Bank and Colusa Creek, the deposition is still taking place. These two localities are worthy of the closest study by those interested in the conditions of mineral deposition. The hot—almost boiling—waters are still depositing cinnabar, sulphur and gold at Colusa Creek, and the underground workings of some of the mines here, which are almost unbearably hot, illustrate so finely the conditions under which many minerals are formed that a visit to them is most profitable and instructive. At the Sulphur Bank there are good illustrations of the manner in which hot mineral waters decompose and remove solid rock, partially substituting the minerals originally held in solution.

As cinnabar is still being formed, it follows that deposits of this mineral may be looked for in any and all of the rocks in the quicksilver belt. Large masses of red croppings are widely disseminated through the gold belt, going by the name of "quicksilver rock." They are the result of the same mineralizing action as the workable deposits, but in many cases do not contain the mineral in noticeable amount. In superficial appearance they are somewhat similar to the great red croppings along the mother lode, consisting of the carbonates of lime, iron and magnesia in a skeleton work of opaline silica. The gangue of the mother lode often contains maraposite, while its silica is crystalline. Quicksilver deposits are found from Santa Barbara county on the south to Siskiyou county, and at a few places in small amount in El Dorado and Tuolumne counties.

Since the quicksilver ores have been formed so recently, very little erosion of the surface portions has taken place. Nevertheless, the deposits have not been found to extend to as great depth as those of some other minerals. Below 1500 feet, or even at much less depths, they begin to show signs of giving out. In the case of gold, on the contrary, we have no adequate means of measuring the depths reached by the veins, for thousands of feet of the surface have been removed by erosion. The deepest mines on the mother lode do not appear to have reached poorer rock. There is an exception, however, to be noted in the case of the gold veins at Bodie, where it appears that the conditions of deposition were more nearly like those of cinnabar. There the veins have been found to be profitable to a depth of only 700 feet, and in places much less. The Bodie veins have the appearance of having been formed in more or less open fissures, a condition which does not seem to have prevailed during the post-Jurassic period of gold deposition.

The few gold veins found in the Cretaceous rocks at Colusa Creek are more curiosities than anything else, although some gold has been taken from them. In one mine gold is associated most intimately with cinnabar, while in others it is found in quartz which occurs lining open fissures through which hot waters once flowed.

Just why the deposits following a certain disturbance should be quicksilver in one region and silver or gold in another it is difficult to say. It may be due to different conditions of precipitation or, more likely, to the solvent power which different kinds of solutions possess in their actions upon the minerals disseminated through the rocks.

There are many other less important minerals, the geology of whose occurrence has not been fully investigated. Among these might be mentioned the iron ores, antimony, ochres, etc.

The variety, quality and accessibility of our building stones are, with few exceptions, unknown. Granite, marble and sandstone are abundant in nearly all parts of the State. In examining them for economic purposes we must take into account the geological conditions to which they have been subjected. In a country where mineralization is so widespread it is not to be wondered at that iron pyrites is so often met in rocks which otherwise would be good for building purposes. The great trouble with the many excellent building stones found in the Coast ranges is the fact that they have been so fractured in the oft-repeated mountain-making movements that large pieces free from flaws are difficult to obtain. The younger rocks, if coherent enough, are more apt to be free from such imperfections. The great bodies of granite and marble in these mountains are very often rendered totally unfit for building purposes on account of the crushing to which they have been subjected.

The recent geological history of California is, perhaps, as interesting as any and can be more easily understood. The most important of the events of early Quaternary times was the glaciation of the Sierra Nevadas. Although this has been greatly exaggerated, it was, nevertheless, an important event. Opinions differ as to whether glaciation in the Sierra Nevadas occurred at the same time that great ice sheet covered the Eastern and Northern States. The cause of the ice period is now more generally attributed to the elevation of land areas, and with this view it is not necessary to consider that glaciation took place here at the same time as in other regions. It seems, also, that the glaciers did not reach lower than an elevation of 5000 feet, and many phenomena attributed by uncritical observers to ice, not only in the Sierras but Coast ranges, have really no relation to it. In the great basin area of Nevada the glaciation of the Sierras was the time of the large and numerous lakes, chief among which was Lahontan. It is probable, also, that at about the same time the coast of California was more elevated than at present, and that the Santa Barbara islands were connected with the mainland.

As a result of the increased elevation and snow the country became colder and the great mammals of this period, the elephant and mammoth, wandered over California, as we know by the bones frequently found. It is quite possible that man shared the country with them, or even came at an earlier date. Russell found a flint implement in the clays of glacial Lake Lahontan, and there seems to be good evidence that human implements and remains have been obtained from the auriferous gravels underneath the lava flows.

The great lakes which existed in Nevada and eastern California have mostly dried up, and from their former beds we obtain soda, borax and other minerals. These alkali and borax flats are situated in the lowest portions of many of the depressions where the water last stood and occasionally appears in the present period. From the borders of these flats slope back for many miles the desert gravels and boulder-covered slopes leading to the mountain canyons.

The minerals found on the flats were probably gradually leached from the decomposing rocks surrounding the basins; springs also may have furnished some material. The streams emptying into these basins having no outlet gradually enriched them, until, upon the drying up of the waters, the minerals held in solution were left mingled with the clay sediments.

Since the great lava floods of northern California were formed volcanic action has gradually been decreasing, and within the bounds of the State there is no record of any lava flow having taken place for about the space of 200 years. This last flow was in the Lassen's peak region. The larger portion of the lavas found in the State have not flowed out of volcanic cones but from fissures. Volcanic cones are among the last products of an eruptive period, as a general thing. Because volcanic activity is quiescent in California at the present time, it is no indication that it has permanently ceased. Earthquakes indicate that movements of the crust are still taking place, and no one can tell when these movements will become violent enough to be accompanied by lava eruptions.

We must become used to the idea that the geological processes are going on to-day as they always have. Slow changes of level of the coast are taking place. It is possible that in comparatively recent times the Sacramento river flowed down through the Santa Clara valley to the bay of Monterey, instead of out through the Golden Gate. Before the recent subsidence about the bay of San Francisco took place, the Farallones were probably a part of the mainland, for an elevation now of 180 feet would connect them with it.

The problems of geology have to deal in an economic way with many other things than the occurrence of minerals. The character of the soil, and the water supply, are largely dependent upon geologic conditions. The soil varies with the chemical character of the rocks, except in valleys where it is made up of the wash from the adjacent mountain slopes. The character of the soil from different kinds of rocks is well illustrated by dikes of serpentine, which, if they extend through a wooded, hilly country can be easily traced by the lack of plant and tree growth.

The rainfall varies enormously in different parts of California, but this is not by any means the only condition governing the available water supply of any particular section. Those areas covered by lava flows are characteristically devoid of springs, because the more or less porous condition of the rock permits the water to flow beneath the surface, where it is generally inaccessible unless the country is cut by canyons, which permits it to emerge. This condition of things is particularly characteristic of northeastern California and, to a less extent, of volcanic areas in other portions. Even where the rainfall is light, water can be obtained if the underground conditions are favorable. Most of the wells put down even by professionals are located without any regard to the demands of geologic structure. These simple problems in practical geology ought to be better understood, for a little knowledge will often enable one to determine with some degree of accuracy the best place to search for water. There are large portions of the State where the possibility of tapping underground waters is of the highest importance. There are areas where it is not practical to collect surface waters in reservoirs, and in many of these a knowledge of the geology of the district will solve the problem.

Geology teaches another important thing in regard to those regions where the rainfall is fitful, and where, when it does come, it is torrential. That is, that unless care is taken the protective covering which nature has spread over the surface in the form of vegetation will be removed and destructive conditions started in operation. The less the absorptive nature of the surface the sooner the rain escapes, furrowing the surface and allowing it to dry out quickly. The danger is not so great where the rainfall is distributed more evenly through the year and in a level country. In a region possessing the climate of California there is considerable danger in many places that man will so disturb the balance of the forces of nature that much harm will result. Let us take an illustration with which we are familiar, the shoaling of the bays and rivers from the detritus deposited from the water. In the case of the streams draining into San Francisco bay this has been laid chiefly to the hydraulic mines, but the blame is in part misplaced. Any one who travels over the hills and mountains can easily see, if he be observant, the erosion which has taken place since man began to cut into the hills for various purposes, since stock killed off the grass and formed innumerable paths, where gullies begin to be formed. With the covering of the surface broken, every heavy rain removes an immense amount of soil, a large part of which eventually reaches the rivers.

When we are better informed concerning the processes of nature, these and many other questions will be looked at in a new light.

The elementary principles of geology are perhaps less understood than those of any other science which has to do with our every-day lives. If we can get an insight into the subject it will not only prove of fascinating interest but be of the greatest practical value to all who work in or upon the earth.

Man has come to attain his present position through the operation of natural laws. The better and more thoroughly he attains to a knowledge of these laws, and especially those governing the changes and development of the earth on which he treads, the better he becomes fitted to make use of the inexhaustible riches around him.

Bolivian Mines.

The British Consul at Callao, in a late report, says that Bolivia derives her wealth almost exclusively from her mining industry, which is on an important scale. No country in the world has lost so much in consequence of the fall in the value of silver, which is her chief production. This depression has been intensified by other causes, such, for instance, as the influx of water into the lower workings of the Huanchaca mines, and, so far, the efforts which have been made to drain them have met with no success. In the Potosi the Royal Silver Mining Company has not been very fortunate, although over $1,000,000 have been spent. However, an improvement is reported as having taken place of late. In Colquechaca former mismanagement of the principal mining establishment is said to have been the cause of the diminution of the production, but things are now on a better footing. On the other hand, the mines in the Oruro district have given satisfactory result. The amalgamating works at Huanchaca have just been closed. All the ores from Huanchaca and several other mines are now sent to the great reducing establishment at Antofagasta, called Playa Blanca. This establishment is one of the largest in the world, and is said to have cost from $7,000,000 to $8,000,000. Gold washing is carried on in Bolivia, but on a small scale. At Tipuani, to the north of La Paz, a good deal of this metal has been obtained at different times from auriferous alluvia. Even from the bed of the La Paz river, within thirty minutes' walk of the city of that name, small quantities are obtained yearly. Auriferous quartz is found in several parts of the country. A reef of considerable extent exists in the province of Chayanta, and another at San Simon, on the banks of the river Itenes. The latter has been greatly extolled, but it is said that fevers and wild Indians impede mining operations. The tin mines of Bolivia are of great importance. One of the most productive is that of Ayevaca, in the Oruro district. According to an experienced engineer, the lodes are from 1 to 3 feet wide, giving masses of solid ores averaging some 40 per cent of the metal. The tin ore is found along the eastern border of the plateau from Lake Titicaca to near the south boundary of the Republic, but the richest zone lies between latitudes 17° and 19°. It is estimated that the yearly output is from 5000 to 6000 tons. Copper of

excellent quality is obtained from the Corocoro district. It is packed in bags in the form of "barilla," sent in barges to the mouth of the Desaguadero canal, and conveyed across Lake Titicaca in the steamers of the Peruvian Corporation. From Puno it is sent to Mollendo for shipment to Europe. The mode of extracting this ore is a very primitive one; were suitable machinery used the production could be greatly increased. The Chorolque mines, in the department of Potosi, are of great importance, but the fall in the price of bismuth has affected them greatly. This industry is in the hands of one firm, which has been acting in concert with other producers in Europe for the purpose of establishing a monopoly of that article.

The Yukon, Alaska Mines.

Written for the MINING AND SCIENTIFIC PRESS by BYRON E. JANES.

This winter there are about 1200 men in the country, distributed as follows: About 700 at Circle City and the tributary diggings, possibly 25 on Seventy Mile and American creeks between here and there, about 125 at Forty Mile and the diggings on the head of Forty Mile and Sixty Mile rivers, and at least 350 in the new Bonanza and Hunker districts.

A fair idea of the general location of these places can be had from a U. S. Coast and Geodetic Survey map. Bonanza and Hunker creeks are tributaries of the Klondiek river near its mouth. It is about fifty miles above here and three miles above old Fort Reliance, on the east branch of the Yukon. The town started at the mouth of the Klondiek river has been named Dawson, and already boasts a sawmill, three saloons and about fifty cabins. Bonanza creek was discovered in the latter part of August, and in one month the discoverer took out $1000. Since the cold weather began, so that holes could be sunk by thawing the gravel, commonly called "burning," the creek proves to be as rich as any yet found in the Yukon country. One of the richest claims has a pay streak 30 feet wide of 3 feet of bedrock and 4 feet of gravel, which will average, it is claimed, $1 to the pan, but I think 50 cents is nearer it. For two miles each way from this claim good pay has been located at close intervals.

About half a mile above the Discovery claim is a tributary of Bonanza, called El Dorado, which has very good pay for a mile and a half from its mouth, though it is not equal to that on the first claim mentioned.

Hunker creek has not been prospected much yet, but will doubtless have some good claims. Bonanza creek is about twenty-five miles long, and on it and its tributaries there are located probably 400 claims of 500 feet each, and half that many in Hunker district. Of that number, some will never pay, many will pay wages and maybe a little more, and a goodly number will give their owners snug sums.

The prevailing wages of the country are $1 per hour, depending on the distance from the supply point. From five to eight hours is a winter day's work.

The diggings at the head of Forty Mile and Sixty Mile rivers are from one to ten years old, and, while none of them are so extensive as Bonanza's, they have had diggings as rich as any but the very best on Bonanza.

Now, as to the methods used: The diggings are of two classes—summer and winter. Most of the creeks have a slight fall and wide bottoms, the gravel being covered by 1 to 10 feet of muck, or soil, (not glacial drift). The bedrock is often 20 feet deep, and since the ground never thaws more than 2 or 3 feet from the surface, drains and ditches are expensive; so each winter more "burning" is done, which consists in thawing the gravel by fire, removing it and repeating. The muck thaws but little, and makes a good roof for drifting. The dumps are sluiced with the first water in the spring. Sometimes the creeks do not freeze up solid and the water gives trouble—that being the case this year in places where the average temperature for the past five weeks was 10° below zero. There is promise of a cold spell—the coldest, 45° below zero, being recorded to-day. Last year at this time the daily mean was 55° to 65°.

Summer diggings are expensive to open for work, but the net returns are often more than if "burning" had been the method. In most cases lumber must be whipsawed, the average cost being $150 per thousand feet. Other things being in proportion, considerable expense is incurred before the ground is ready to shovel into the sluice boxes.

In all probability there will be work for all that come in this spring. Bonanza is in an unprospected section of the country, though there may not be many new creeks found. No one should think of coming unless he can land with $500, if he purchase his outfit at Juneau, and twice that if he purchase after arrival here.

But little attention has been paid to quartz particularly, as the hills and valleys are covered by a heavy growth of moss. So far nothing but small stringers have been found in the bedrock. Nuggets are often found which are more than half quartz.

Forty Mile, Northwest Territory, Jan. 21st, '97.

Charactertistics of the El Dorado Gold Belt.

Written for the MINING AND SCIENTIFIC PRESS by A. THURSTON HEYDON.

Of all the mineral belts gridironing the western slope of the Sierra Nevada, none has yet equaled the mother lode in its entirety as a wealth producer, for, aside from the value contained in its immense ore bodies, in its immediate neighborhood, unmistakably formed from the gold released by the wearing away of its ledges, were placer deposits whose richness has never been surpassed in mining history. This belt, which is not only the oldest, but was formed, as a whole, under the most favorable conditions, has been a marvel to the mining world, not only because of its great extent, but also on account of the great size and permanent character of its ore bodies. No other gold-bearing quartz belt in the world has yet equaled it as a wealth producer.

Rich though it be, all portions are not equally mineralized, consequently, on account of the permanent character of its mineral centers, the most prosperous quartz mines along its course are located in the immediate vicinity of the places noted for the richness of their placer deposits.

El Dorado County.—This is the county in which Marshall made his discovery of the great placer deposits of the Sierra Nevada on the 24th day of January, 1848. While it would be difficult to prove that it was the richest portion of California, still the statement that no portion of the State was richer is beyond successful contradiction.

The mother lode runs north and northeasterly from one side of the county to the other, a distance of some thirty miles. Partly on account of a change in the line of the forces which elevated the Sierra Nevadas, and partly from the compression caused by the intrusion of large masses of igneous rocks, principally to the west, the line of the mother lode has been deflected, and, in the northern portions, where the igneous rocks had intruded themselves within the belt itself, its various ledges diverge and apparently abruptly terminate at the northern boundary of the county. At this point, to all appearances, the line of weakness, along which the fissures opened, shifted westward, although it still continues northward.

This change of conditions, whose attendant effects will be touched upon in the description of the formation of the "central belt," under which the mother lode in this region was formed, has produced a mineral section differing more or less from any other upon its line. For this reason it has been misunderstood, mismanaged and condemned for years. Still, in spite of these drawbacks, time will prove that twenty-five miles of this belt, with Placerville as the center, will yet equal any other twenty-five miles in the whole State.

Placerville.—In the early days Placerville was the most important town in the mining region and the second largest in the State. Its wealth in placers was almost fabulous, and the mother lode runs directly through it. Every ravine fed by the gold released by its wearing away was literally paved with gold, and the total yield of placer gold derived from this source alone seems like an Eastern fairy tale, as it foots well up into the millions.

The Central Belt of the Mother Lode at Placerville.—As far as can be determined by the present developments the central belt of the mother lode was formed in the following manner at this point: During the process of mountain building which uplifted the Sierra Nevadas the slate belt known as the Mariposa formation was lifted on edge, and shortly afterwards the dyke of feldspathic, chloritic and magnesian rock, now called serpentine in its altered form, was intruded, and this, locally called "greenstone," forms the foot or western wall of the central belt, which dips east.

At various periods thereafter the long-continued strain opened and reopened fissures along the line of weakness upon its eastern side. At first these fissures extended to the depths favorable for the formation of a calcareous or lime rock, locally known as porphyry. After various fissures had been filled with porphyry came the tremendous pressure from the western intrusion of igneous rock, which crowded the whole formation eastward, fracturing and shattering it to a marked degree. Afterwards another period of uplifting reopened the fissures, which penetrated this time to the mineral producing sections of the earth's crust.

The mineral, upon its way to the surface in the form of metallic vapors, also in solution with hot waters, was deposited with a regular irregularity wherever the conditions were favorable for the precipitation and accumulation of mineral. The hot mineral-laden waters oozed through the network of seams in the greenstone, porphyry and slate, depositing gold and quartz in the seams, as well as enriching the enclosing rocks themselves by infiltration. During this process many of the rocks became altered, as the hot waters dissolved many of their constituents and replaced them by others. In places the conditions were favorable for the regular process of ledge formation, that is, the enlargement of the fissures by the hot waters dissolving and carrying away a portion of the enclosing rocks in return for the mineral deposited, until a regular ledge of size was formed.

But to a large extent the gold was deposited in the seams; consequently, when there was an opportunity to cut out and fill, the waters had nothing but quartz to deposit, the result being the formation of a body of barren quartz. This fact has led many astray, as they were so accustomed to finding the pay within the bodies of quartz that the idea seems never to have occurred to them that the pay could be associated in any other way in remunerative quantities.

In the mother lode it is no uncommon occurrence to find that the quartz-seamed black slate associated with the ledge contains enough gold to pay for working, while it is all that enables some to be operated profitably. In such cases it has been transformed by the ledge-producing agencies, until it has become pay ore, and is then known by miners as "black quartz."

The Location of the Pay.—The pay, especially near the surface—as developments have proven that the ledges grow more regular with depth—will be found in the quartz-seamed slate, the quartz-seamed porphyry and in the quartz-seamed greenstone, on whose eastern side have been found the largest deposits of gold produced by the mother lode. The large masses of quartz, until the formation becomes regular with depth, are comparatively barren, for reasons above stated. The pay is, to a large extent, in what was country rock, what still looks like country rock, but is not country rock, as it has been so altered and mineralized that it has become ore.

The Cry of Pockets.—The opinion prevails to a marked degree, among shallow thinkers, that because a ledge contains pockets to a marked degree it is not a milling proposition. Yet an ore body is nothing but an immense pocket. In this section all ore bodies contain pockets of greater or less value. The pocket formation to beware of is that in which only an occasional pocket is found and everything else is barren. To such the term "pockety" is extremely applicable.

It makes no difference whether the pay is in plates or fine; whether it occurs in a solid quartz ledge or in the fine quartz seams and altered country rock; whether in pockets or evenly disseminated throughout the mass, if it is only there in sufficient quantities to make a profitable average.

Regarding this point, the ledge matter moved by pocket hunters on a section of the main belt 1700 feet long, in their search for pockets, has been measured and, taking only the gold, concerning which there is definite information, and leaving out the amounts taken out irregularly, as well as the values remaining in the rock, too poor to crush in a hand mortar, the division gave an average of over $8 per ton. This was where $3 rock in such quantities would have paid a heavy dividend if properly worked, and also where every one has claimed for years that the ledge was only good for "pocket hunting."

Electric vs. Water Power.

According to the Calaveras *Prospect*, the following figures from the California Exploration Company show the comparative cost of water power under various heads at 20 cents per miner's inch and electrical power in the districts in Calaveras county which it is proposed to supply:

Head in feet	Horse power	Inches	Water power, value per month	Electricity, value per month	Difference	Favor
100	15	62	$ 372.00	$127.50	$ 244.50	E
"	28	109	654.00	210.00	444.00	E
"	44	172	1,032.00	330.00	702.00	E
"	62	246	1,476.00	441.00	1,035.00	E
"	112	439	2,634.00	728.00	1,906.00	E
150	13	34	204.00	110.50	93.50	E
"	28	76	456.00	210.00	246.00	E
"	50	134	804.00	375.00	429.00	E
"	80	210	1,260.00	560.00	700.00	E
200	11	22	132.00	93.50	39.50	E
"	20	39	234.00	170.00	64.60	E
"	44	88	528.00	330.00	198.00	E
"	78	155	930.00	546.00	384.00	E
"	122	242	1,353.00	793.00	559.00	E
250	15	25	150.00	127.50	23.50	E
"	27	44	264.00	202.50	62.50	E
"	61	98	588.00	427.00	161.00	E
"	109	173	1,038.00	658 50	379.50	E
300	20	27	162.00	170.00	8.00	W
"	35	48	288 10	262.50	25.50	E
"	80	107	642.00	560.00	82.00	E
"	143	191	1,146.00	925.50	220.50	E
350	26	30	180.00	195.00	15.00	W
"	45	52	312.00	337.50	24.50	W
"	103	117	702.00	669.50	32.50	E

RATES.

Up to and including 1 H. P., $12.50 per H. P. per month.
From 2 H. P. to 10 H. P., $10 per H. P. per month.
From 11 H. P. to 25 H. P., $8.50 per H. P. per month.
From 26 H. P. to 50 H. P., $7.50 per H. P. per month.

The Spitzkasten and Settling Tank.*

By R. H. RICHARDS and C. E. LOCKE, Boston, Mass.

In "Sorting Before Sizing" (a paper first announced at the Pittsburg meeting, February, 1896, but delayed in preparation and now presented at the present meeting) it is shown that if slime tables are to do their best work on slimes below 0.5 mm. or 0.02 inch in diameter they must be carefully sorted or classified, and fed to a series of tables suitably adjusted to the different slime sorts. The reason is that the coarser and finer slime sorts require respectively different adjustments of the tables. Hence, if the two are fed together upon a table which has, as nearly as may be, average adjustments, fine galena, for example, will go into the tails, or coarse quartz into the heads, or both—losses which could have been largely prevented if the slime had been carefully sorted and each sort sent to its own slime tables.

As indicated in the paper just mentioned, the present tendency in this country is generally to do away with slime sorting or "classification," and simply take the overflow from the hydraulic classifier and divide it among the tables by means of a distributing tank. We must, therefore, look to the old country to see what means of slime sorting have been approved.

The spitzkasten is the only apparatus recognized by such authorities as Rittinger and Linkenbach. Reducing Rittinger's Austrian measures to metric units, we find that in 1866 he recommended for 100 liters per minute the following dimensions:

	Width, mm.	*Length, mm.*
First box	100	1896.6
Second box	200	2845.0
Third box	400	3793.2
Fourth box	800	4741.5

And so on. Increased quantity of material treated widens in geometrical progression, and lengthens in arithmetical progression, the pointed boxes.

Linkenbach (1887) recommends for 100 liters per minute of slime:

	Width, mm.	*Length, mm.*
First box	228	3600
Second box	342	4800
Third box	513	6000

With the same rule for increased quantity. Both authorities declare that 50° is the minimum angle that can be allowed for the sides of the box, but their diagrams mostly show as much as 58° for the minimum angle.

Rittinger, who was the inventor of the spitzkasten, describes its action as a separation in a horizontal current according to the law of equal settling particles. In the light of recent investigations we prefer to use the term "free settling." He says, further, that, in order to prevent slime from depositing, the sole of the feed distributor should descend to the inlet of the box at an angle of 1° 15′ or 0.25 inch to 1 foot for the coarser sorts, and 0° 6.25′ or 0.02 inch in 1 foot for the finer sorts, and should enter at the exact level of the exit. Linkenbach favors raising the sole of the feed distributor to 1 or 2 inches above the entrance, for the same purpose.

For the last box, Rittinger favors destroying the surface current by an inverted dam, making thereby a settling tank of this box. Linkenbach favors cutting up the boxes, when they are large, into two smaller sets, thereby discharging the spigot products at a higher level, and diminishing the weight of the loaded apparatus.

Both authorities make note of the fact that the spitzkasten gives only an approximation to true sorting according to the law of free settling particles, but neither authority tells wherein, or how far, the spitzkasten departs from perfect sorting.

In these directions the authors have sought to supply some missing data, and the lines which their investigation has taken are:

First—The horizontal current; what is its form and what becomes of it?

Second—The feed distributor; what is the effect upon the current of varying the angle of its slope?

Third—Can the current be so confined as to make it a true horizontal current?

Our spitzkasten is like that of Rittinger in every respect, except that we need no spigot to discharge water below, and our sides are vertical (which, indeed, is the case also in some of Rittinger's boxes).

As representing nearly the speeds of the three boxes of Linkenbach for a width of 8 inches, three rates of current were selected, namely, 190, 126 and 85 pounds of water per minute, respectively.

I.—*The Form of the Current.*—These experiments show, in the first place, that the surface current has the form of a wedge, widening (*i. e.*, deepening) towards the outlet, and having, for the current of 190 pounds per minute, an apex angle of 11°, and for 85 pounds 24.5°. The angle found for the 126-pound current was 16.5°. The water composing these wedges is most rapid on the surface (where the friction of the air may be disregarded), and the surface velocity is: For 190 pounds per minute, 10.84; for 126 pounds, 8.29; and for 85 pounds, 7.05 inches per second. The velocity decreases with increasing depth, until at the bottom of the wedge it does not exceed: For 190 pounds per second, 3; for 126 pounds, 2; and for 85 pounds, 1 inch per second.

*Trans. Am. Inst. Min. Eng., Chicago Meeting, February, 1897.

These wedges are the result of the mixing of the so-called stagnant water below with the surface current by an action to which we shall refer as head suction, or upward current on the head partition, which widens them and slows their speed.

In the second place, it will be noticed that there is a wide undercurrent or eddy, returning down the slope of the tail partition, and carrying with it a portion of the slime, which should be taken to the next box of the series, but which passes, instead, down the tail partition to the bottom and then up the feed partition to rejoin the wedge.

Thirdly, we notice that there is a top layer which passes off at the outlet.

An approximate estimate was made of the two quantities, namely, that going over the outlet, and that passing down in the undercurrent. From these dimensions and the width of the spitzkasten (8 inches) we can compute the following values:

Water per minute. Pounds.	*Overflow. Cubic inches per second.*
190	86.6
126	58.0
85	39.6

These results were checked by weighing the overflow with scales, the result being:

Water per minute. Pounds.	*Overflow. Cubic inches per second.*
190	87.7
126	58.0
85	39.2

We get also as the measure of the undercurrent:

Water per minute. Pounds.	*Undercurrent. Cubic inches per second.*
190	134.5
126	263.4
85	230 7

These figures show an extraordinarily large quantity of slime-charged water sent down into the stagnant pool in proportion to the feed and overflow. There are, to be sure, errors in the computation.

The authors are of the opinion that a flat layer which comes in at the feed and goes out at the outlet without forming a wedge with its tail undercurrent and head suction is the ideal condition to be attained, if possible, and that the more any particular form departs from that ideal the more unsatisfactory it is.

II.—*The Slope of the Feed Sole.*—A series of trials was made to get the best slope of the feed sole. The angles tested were 0°, 5°, 8°, 10°, 15°, 20°, 25°, 28° 30′ and 30°. Of these, 5° to 10° gave the narrowest angle of wedge with all the different water quantities. This conforms with Rittinger's and Linkenbach's requirement, namely, that fine slimes must be prevented from settling on the feed sole.

Angles larger than 10° tended to widen the wedge somewhat, and showed no gain to compensate for the loss of head. When 30° was reached a curious change took place. The whole current followed down the slope of the head partition and formed a head undercurrent, that is, a current at the feed end. Since 30° is more than half of 58°, the sole was set at 28° 30′, or about one-half of 58°; and the curious phenomenon was then observed that the feed current was indifferent as to which of the two ways it would go, namely, as a head undercurrent or as a horizontal surface current. By placing a bit of iron plate under it it could be guided to become a surface current, and by placing the sheet iron over it at the proper angle it could be deflected downwards and become an undercurrent. But it absolutely refused to take any intermediate position. It was either surface current or undercurrent, and, when once directed, it would continue to flow as directed after the guide plate had been removed.

Next a special set of variations in feed slope was tried, comprising the following forms:

1. A catenary curve having 6-inch drop and 6-inch advance.

2. A cycloid curve, drawn by 6-inch circle, rolling on a straight line.

3. A horizontal feed sole, depressed 1 inch below the overflow.

4. A horizontal feed sole, raised 1 inch above the overflow, and meeting the head partition at an obtuse angle of 122°.

5. A horizontal feed sole, raised 1 inch above the overflow, its end being cut off square.

The catenary (No. 1) gave a higher speed than the 5°-slope feed sole; but no gain in angle of wedge or diminution of tail undercurrent was observed.

The cycloid (No. 2) gave the most rapid current of all; but no gain in wedge angle or diminution of tail undercurrent was observed.

When the horizontal feed sole was depressed 1 inch (No. 3) it gave a wedge angle of 25° for 190 pounds water, which was wider and more unsatisfactory than that for 86 pounds.

When the horizontal feed sole was elevated 1 inch (No. 4) above the outlet, and the feed sole and head partition met at an obtuse angle of 122°, there resulted a head undercurrent like that given by a 30°-slope, the horizontal current having disappeared altogether.

When the horizontal feed sole was elevated 1 inch, but the end of the board was sawed off square (No. 5), a case of equilibrium was presented like that of the feed sole sloping 28° 30′; a plate-iron guide could cause it to establish either a surface current or a head undercurrent, and, once established, the water would flow on in the course allotted to it until it was disturbed.

Our conclusion is that a flat feed sole, sloping 5°, and joining the head partition at the level of the overflow, will give the best results.

By the experiments recorded above we are satisfied that the spitzkasten is not a scientifically exact instrument. The trommel, jig, spitzlutte and separator, when well constructed, and the slime table, when properly adjusted, are all scientifically accurate instruments; that is to say, when fed with suitable material, and not overfed, they will all do perfect work. They depart from scientific accuracy only through overfeeding, or through the feeding of material that is not susceptible of perfect work, or through imperfect construction. The first two of these causes are due to the demands of commerce; the last, to ignorance.

The spitzkasten, on the other hand, is scientifically imperfect. It cannot be fed with such a product, or at such a speed, or so adjusted to suit its feed, that it will do perfect work. There is always the tail undercurrent to contaminate the product from the spigot.

Can this defect be cured in any way? Three means have been considered, consisting in the use, respectively, of

(*a*) A balanced hydraulic water supply.

(*b*) An upward current of hydraulic water.

(*c*) A perforated board.

Under *a* and *b*, by balanced hydraulic water is meant an addition of hydraulic water, which will exactly supply the spigot with the right quantity of water, no more and no less. This is an extremely difficult thing to do. A slight excess of water, that is, an upward current, will prevent a free discharge and cause a troublesome accumulation of products in the box; while a slight deficit will carry down contaminating fine slimes.

The method of applying this water by a vertical tube inside the box is not approved by the authors, as it will seriously disturb the surface current. If hydraulic balance water is to be used, it should be put on outside with the T and plug or T and gooseneck discharge.

Under *c* (perforated board) a ¼-inch board was perforated with ¼-inch holes, which were 1 inch from center to center on the cross rows, while lengthwise the rows were 1 inch apart from center to center; but the holes of one cross row were staggered ½ inch with the holes of the next. This was done throughout to give the grains full opportunity to fall through the holes.

This perforated board was 47½ inches long, of which 12 inches was blank, and served for feed sole, while 35½ inches was perforated, as above described. The board was placed horizontal, with its top surface on a level with the overflow.

The apparatus was, therefore, a continuous acting rinne (German) or run (Cornish), in which the grains suitable for deposit at any time could drop through the holes, and those not suitable could be carried forward.

This perforated board must have, at least, a balanced hydraulic water. It is quite possible that if the hydraulic is introduced in the stagnant water space, with means to break up its current, a noticeable upward current could be used, which would go far towards keeping out altogether the objectionable fine slimes, and towards the yielding of a product truly sorted, according to the law of free settling particles. Such a hydraulic should be applied as a horizontal current for the whole width of the box, and directly beneath the feed sole.

The authors are aware that a perforated board has been used in France. They, however, did not know of its existence until after the work here recorded was done. They are aware, also, that the Kohinoor mill, in Missouri, has a spitzkasten with a first box supplied with a horizontal lattice work.

The Settling Tanks.—The overflow from a spitzkasten with balanced hydraulic water must go to a settling tank to extract the pulp which is to feed the last table, as the slime water has not been lessened, and may have been increased, in volume by its passage through the spitzkasten.

A settling tank which is fed with a horizontal current at the surface will have a bad surface current of wedge shape, which will probably have an angle not narrower than 12° nor wider than 25°, according to the way the current is introduced. If it is fed above the surface it will produce a head undercurrent, which is as bad as the surface current. If it is fed with a plunging stream, this will pass to the bottom and flatten and form a bottom undercurrent. All these ways of feeding are, therefore, bad.

To make the most of a settling tank, the current of feed slime must be brought to approximate rest as soon as possible after entering the tank, and a very slow movement must be established, which is of uniform velocity from top to bottom and from side to side. An even surface distributor across the inlet end, deep enough to slow the current greatly, and with a bottom steep enough to prevent the settling of slime, and this followed by two gratings made up of vertical bars 1 inch square with 1-inch spaces, the bars of the first grating staggered with those of the first, will probably prove satisfactory.

The Consolidated Kansas City Smelting and Refining Company.

The metallurgical works of the Consolidated Kansas City Smelting and Refining Company consist of three reduction plants and one refinery, all of which taken together constitute the largest and most modernly equipped institution of the kind in the United States. The parent plant, located at Argentine, a suburb of Kansas City, Mo., comprises reduction and refining works. In the reduction department of this plant the equipment is modern and thorough for reducing silver-lead ores to base metal and also for reducing copper ores to copper matte. In the refining department the base bullion is handled and the gold, silver and lead are separated from each other. A special feature of the refinery consists of a complete and extensive copper-refining department, where the copper matte is reduced to refined copper ingots. The Argentine plant covers an area of twenty acres of ground and at this time it has a smelting capacity of 15,000 tons of ore per month. The capacity of the refining department is as follows: Silver-lead refining, 6000 tons of bullion per month; copper refining, 1,000,000 pounds of ingot copper per month. During the year 1896 the silver-lead refinery produced at the rate of 1,250,000 ounces of silver and $335,000 of gold per month. The Argentine plant was established in 1881 and the first year's output, that of 1882, was 2168 ounces gold, 645,246 ounces silver and 13,651 pounds of lead. To show the growth of the plant in the intervening time, it may be cited that within the year 1896 the total output was: Gold, 201,343 ounces; silver, 5,482,924 ounces; lead, 82,413,919 pounds; copper, 4,438,814 pounds. This output for 1896 was the result of handling at the Argentine plant of over 300,000 tons of raw material.

This company's Colorado plant is situate at Leadville, the greatest producer of carbonate silver-lead ores of any camp in the world, and which is now becoming prominent as a producer of high-grade gold ores. The Leadville plant, known as the Arkansas Valley Smelter, has all the equipment of a modern smelting plant, having a capacity for the reduction of 27,000 tons of ore per month. The Leadville plant covers ten acres of ground and is the most thoroughly equipped smelter in the State of Colorado. Its location at Leadville will be recognized as an advantageous one, when it is recalled that this district has never been equalled as to tonnage of ores produced. It is on a great mineral zone which shows no signs of exhaustion. The constant discovery of new ore bodies and the opening of new mines, with a tendency to a widening of the district, prove all this. Notwithstanding the labor troubles of the past year, which seem now to be practically settled, the camp has steadily produced a large tonnage of ores. A striking feature of this production has been the marked increase of the gold output, which in 1896 amounted to $1,524,363.

The third plant belonging to the Consolidated Kansas City Smelting and Refining Company is located at El Paso, Texas, the gateway city between Mexico and the United States. This plant is the pioneer among smelting works in the Southwest, whose establishment at El Paso resulted in a rapid development of the mining interests of New Mexico, Arizona and Mexico, and made it possible for mine owners in those Territories to send to El Paso a grade of ore which would not bear shipment to more distant smelters. Its establishment has likewise opened avenues for other industries to thrive, which otherwise could not have existed.

By reason of the location and equipment of this company's three reduction plants, they are able to draw ore supplies from all parts of the United States, Mexico, British Columbia and Canada. While the Leadville plant obtains its principal supply from the Leadville district, a considerable tonnage of ore is treated which comes from Creede, Cripple Creek, Red Cliff, Breckenridge, Aspen and other Colorado camps, and from points in Utah, Montana, and the Cœur d'Alene lead regions of Idaho.

The El Paso plant derives its supply from New Mexico, Arizona and Mexico. The Argentine plant draws from the larger and more general field of Colorado, New Mexico, Arizona, Utah, Montana, Idaho and British Columbia. The Argentine refinery handles the base bullion from the company's Leadville and El Paso works, and as well from various independent smelting plants of the United States and Canada.

A subordinate branch of this company's business is done by the Mexican Ore Company, which was organized by them some time ago to operate in the Republic of Mexico. This ore company has handled from 50 to 80 per cent of the ore exported from Mexico, and which has been handled chiefly by the smelters and refinery of the consolidated company. In many of the principal mining camps of the United States and Mexico the Consolidated Kansas City Smelting and Refining Company maintain sampling works for the purpose of purchasing and sampling ore to ship to their reduction works. The same company is also an operator of mines in the United States, British Columbia and Mexico, from which its reduction plants draw a portion of their ore supply. It also has offices in Denver, Colo.; Salt Lake City, Utah; Spokane, Wash.; El Paso, Texas; Hermosillo, Chihuahua and Pachuca, Mexico; and the City of Mexico.

As an evidence of the business which this company furnishes the railroads, it may be cited that within the year 1896 the company shipped 25,000 carloads of freight, aggregating about 300,000 tons, making a revenue to the railroads of about $1,750,000. The company has in its employ at its smelters, samplers and offices about 2500 men.



WORKS OF ARKANSAS VALLEY SMELTING CO., LEADVILLE, COLO.

THE commissioner of patents reports for the calendar year 1896 total cash receipts of $1,324,059, and the total expenditures $1,113,413. The balance in the treasury on account of the patent fund, January 1, was $4,718,639. During the year there were 43,982 applications for patents, designs and reissues; 23,373 patents were issued and reissued, 1,864 trade marks, labels and prints registered, and 12,133 patents expired during the year. There are left pending action a total of 8,867 applications. The number of applications exceed previous years by nearly 3000. The report says the work at the end of the year was only thirty days behind, but the record cannot be kept up with the present force.

Costs of the Past and the Present.

The fall in prices of materials, wages and other charges connected with mining has had more to do in most districts in the West with the reduction in the cost of producing gold and silver than have the improvements in methods. In the Comstock, according to the late J. Ross Browne, in his United States Mineral Resources for 1868, the cost of running 938 feet of tunnel in the 400 level of the Gould & Curry was $16.84 per foot, and of 1465 feet on the 200-foot level $16.08 per foot. In the same mine the average cost of extracting ore for the year 1866 was $8.82 per ton. In the Gould & Curry it was $7.86 and in the Hale & Norcross $9.08. In commenting on this, Mr. Browne said: "These results show a marked improvement on previous years, and enable lower-grade ores to be worked more profitably than was formerly the case."

In 1867 the cost of milling Savage ores was $14.04, Hale & Norcross $14.26, and Gould & Curry $13.30. The cost of sinking the four-compartment Bonner shaft of the Gould & Curry to a depth of 692½ feet was $75,738.40.

In Colorado a comparison of the cost of supplies in 1870 and at the present time shows that on an average $27 will buy as much now as $100 in 1870. The following table has been published lately in a Colorado paper:

	1870.	*1897.*
Stamp mill charges, per cord (8 tons)	$35 00	$10 00
Labor, per day	4 00	2 50
Lumber, per 1000 feet	60 00	18 00
Teaming, per day	16 00	4 00
Candles, per box	20 00	4 00
Giant powder, per pound	1 00	14
Fuse, per 1000 feet	30 00	6 00
Nails, per keg	20 00	3 00
Iron, per pound	25	03
Steel, per pound	40	09
Wood, per cord	8 00	5 50
Coal oil, per gallon	3 00	20
Shovels, each	2 75	1 00
Picks, each	3 75	1 00
Rope, per pound	60	15
Smelting, per ton	65 00	10 00

Alabama Mineral Products.

Below are totals of outputs for January, 1897:

	Tons.
Coal	416,858.4
Coke	92,112.0
Iron ore	132,713.0
Pig Iron	60,352.0

This being the first month this effort to obtain statistics has been made, the returns, including totals, are imperfect, and represent only about 75 per cent of actual production for January in Alabama.

EUGENE A. SMITH,
State Geologist and Sec. Ala. Ind. and Sci. Society.
University, Alabama, March 8, 1897.

Scientific Progress.

An Improved Pyrometer.

The air thermometer is used for laboratory work in making precise determinations of very high temperature, but is not suited for every-day use in manufacturing establishments. For this purpose the latest form of Le Chatelier pyrometer promises much. The following description is condensed from an article by Dr. Russner in the *Zeitschr. d. Oesterr. Ing. u. Arch. Vereines*:

Heretofore the fact that an electric current is developed when the junction of two dissimilar metals is warmed has been applied to the indication of very slight differences of temperature, as in the well-known thermo-electric pile. In the Le Chatelier pyrometer, however, the principle is modified by using two metals so nearly alike that a high temperature is needed to produce a moderate electro-motive force. Briefly, the element consists of two wires—one of platinum and the other of an alloy of platinum and rhodium, each wire being about one meter long, and the two being fused together at one end. One of the wires is inserted in a porcelain tube open at both ends; the other is carried along just outside, so that the junction of the wires is at the end of the tube. This tube is then slipped into another tube, also of porcelain, but closed at one end, the junction of the wires being in the closed end, and the two free ends of the wires brought out to connections to a galvanometer.

The whole is enclosed in a protecting tube, open at the end, which is inserted into the furnace whose temperature is to be determined. Since both platinum and the platinum-rhodium alloy have very high fusing points, the portion of the instrument which is exposed to the heat is able to stand very high temperatures, while the galvanometer upon which the readings are made may be at any distance from the furnace, either in the office or in any desired part of the establishment.

Each pyrometer is calibrated by comparison with an air thermometer, and it has been found that an alloy of 90 per cent platinum and 10 per cent rhodium for one wire, and pure platinum for the other, give an electromotive force nearly proportional to the temperature, so that a temperature of 1800° C. produces 1800 microvolts, etc. This is almost exactly true for temperatures of 700° C. and above. An alloy of 85 per cent platinum and 15 per cent rhodium produces a feebler current, an electromotive force of 800 microvolts being produced by a temperature of about 1650° C.

Experimental comparisons with the air thermometer have shown that the Le Chatelier pyrometer will determine temperatures within an error of ± 5° C. for 1000°. One of the instruments was subjected to the continuous action of a Siemens regenerative furnace in a glass works for three and one-half months without injury, following the variations of temperature between 1100° and 1600° C; when recompared with the air thermometer the zero was found to be unchanged.

In this connection the following determinations of fusing points made by the Le Chatelier pyrometer and those of previous observers are given, those of Holborn & Wien having been made with the new pyrometer:

	Voille.	*Barus.*	*Holborn & Wien.*
Silver	954°C	986°C	971°C
Gold	1,045°	1,091°	1,072°
Copper	1,054°	1,096°	1,082°
Nickel		1,476°	1,484°
Palladium	1,500°	1,585°	1,587°
Platinum	1,775°	1,757°	1,780°

A NEW PROCESS for the protection of iron structures against the injurious action of rust has been suggested by a German chemist, M. Deninger of Dresden. It consists of treating the iron with a solution of ferrocyanide, which forms a coating of cyanide of iron, uniform and impermeable to water, and of such a nature as to protect effectively the iron covered. The operation, applied on a large scale, is reported to have already given good results. The following is the method adopted in practice: The solution is mixed with a flaxseed varnish, to which has been added a little turpentine or benzol, so as to cause a very homogeneous emulsion, which can be applied without difficulty. The evaporation of the alcohol leaves the flaxseed varnish, which forms a coat protecting the cyanide of iron which is deposited upon the iron. There is no necessity of previously preparing the iron in any way beyond removing the beds of rust which are too thick to admit of the action of the ferrocyanide.

An Unnecessary Change.

Coleman Sellers, M. E., in his paper on the metric system, read before the American Society of Mechanical Engineers, concluded as follows:

"It is the thing just now to favor the change. A young engineer enlisting himself in the ranks of the metrical reformers (?) buys a cheap scientific notoriety. He is brought into sympathy with the self-constituted advanced thinkers. Those who oppose the change after having become familiar with both, are said to 'sever themselves from the congenial sympathy of the enlightened public opinion of today.' The mechanical engineer can accept nothing as true until he has demonstrated the truth by experimenting; at least, in anything capable of being put to the test of experiment. It is in the power of any intelligent man to test the metric system as others have done. He will, I think, find that the savants who originated the scheme before mechanical engineering, as it now exists, was known as a profession, made the mistake of beginning at the wrong end, the big end of the scale, the size of the world, and by the time they had cut it up or down to human wants it came out less fitted to human requirements than if they had recognized in the beginning the needs of the beings who were to use it.

"Our meteorological reformers urge us to adopt a new system in place of our present one, a system that harmonizes in no way with anything we now use. This new system is practically based on a certain measure over 39 inches long. This is cut up into 1000 parts, and 100 of these parts cubed gives their primary vessel of measurement. The contents of this vessel in distilled water under certain conditions is their pound weight. Had the English yard of 36 inches been so treated it would have been as good a system, but no better. It would have been as inapplicable comfortably to our profession as is the metric. The wonderful extension of the metric system to time and infinite space was given up as impracticable long ago, and we are now asked to bear the shock of a mighty change, to use this inconvenient system, this unhandy system of 10, for the sake of uniformity with some other peoples of the world.

"In conclusion, when we take into consideration the enormous interests involved in manufacturing in America, if it is, as we think, unwise to tamper with the existing metrology of our workshops, the question may well be raised as to the wisdom of enforcing the metric system in trade generally. The practical mind of Americans has already dispensed with much useless stuff, coming to us with our old metrology; is in not better to continue to amend what we have, to encourage the uniformity so desirable, rather than to attempt to make all things new, but in no respect practically better, at so frightful a cost?"

ENVELOPES lined with tinfoil will possibly be a "fad" in the near future, if experiments with the Roentgen ray continue. It has already been demonstrated that the contents of a sealed letter, enclosed in the ordinary envelope, may be photographed. The *Gaulois*, a French paper, has photographed such private matter in fifteen seconds. By using envelopes lined with tinfoil letter writers can defy the X rays in the hands of the inquisitive.

ALUMINUM is little acted upon by mineral waters and withstands the action of sea water better than iron, steel or copper.

Electrical Progress.

Electricity from Carbon Without Heat.

Willard E. Case lately delivered a lecture before the New York Electrical Society on this subject, which has long been engaging the attention of scientists, and while they have succeeded in a number of ways and some of them quite efficient, either the cost of the materials, the lack of efficiency, or the great trouble involved in the proper maintenance of the operation, or all combined, has left the development far short of the ideal, so that to-day the burning of coal under a boiler, the transformation of the latent heat of steam into mechanical energy, and the latter into electrical energy by means of the dynamo, with all of its attendant losses, still remains supreme.

Mr. Case in the course of the lecture said: "Now, the question which we naturally ask is, How are we to convert this potential energy of the carbon into electricity with the least loss? If the boiler, steam engine and dynamo are not available for our use economically, how shall we do it? We know that the voltaic battery does not act through the transformation of heat into electricity—it produces electrical energy direct. The zinc is oxidized and the potential energy of that zinc is converted directly into electrical energy without the production of heat. But the cost of this zinc and the chemicals employed to oxidize it are so expensive that we cannot afford to use them. The cheapest materials which present themselves at present to our notice are coal or carbon and the oxygen of the air. And if we could convert the energy of the coal into electrical energy direct and cheaply, we could do away with our steam motors, in time, provided the apparatus was simple and practical. Now, there is no known reason why a cheap substance may not yet be found which will act on coal and develop electrical currents in place of heat, but the general tendency of late has been to discard this method and to attempt to find some stable electrolyte or bath which will act as a carrier of the oxygen of the air, conveying it to the carbon and oxidizing it as zinc is oxidized in a battery, producing electricity. This electrical energy would be the equivalent of the heat energy that would be developed by the combustion of the coal in the ordinary way.

"Of course, the subject of electricity direct from carbon has been considered from many points of view. Some have attempted to obtain cheap electricity by using the oxygen of the air to oxidize various substances, others have attempted to oxidize coal with the oxygen of the air without heat, and others have attempted to oxidize coal by the oxygen of the air with the application of external heat."

Carbons for Electrolysis.

The extension of electrolytic processes in industrial chemistry has created a demand for terminals which shall be inexpensive and permanent, and numerous patents in this line have been taken out, especially in connection with the electrolytic production of the alkaline chlorides.

Gas carbon is not available in large sheets, such as are commercially required, and hence these have been made of powdered coke, baked with a cementing material in the same manner as electric light carbons are made. Such carbon plates, however, are not permanent, but soon become disintegrated by the action of the solutions, and especially by the action of the liberated gases.

Dr. Alber Lessing, in the *Electrochemische Zeitschrift*, claims to have solved the problem by producing carbon sheets entirely homogeneous and free from cracks, by a fusing process which not only insures the permanence of the sheet, but also increases its conductivity. The new product is said to be harder than steel, readily scratching glass, and proof against the emery wheel, and possesses a metallic ring which testifies to its homogeneity. If these claims are maintained, and the prepared carbon can be produced at a reasonable price, it should soon be on the market for many other uses as well as the one for which it was originally produced.

High Electric Voltages.

Apropos of the constantly increasing voltages in electric transmission lines, Mr. C. P. Steinmetz, the well known American electric engineer, recently remarked before one of the electrical societies that while only a few years ago 3000 volts were hardly considered commercially safe, 11,000 and 12,000 volts are now used extensively, and 15,000 to 20,000 volts are under discussion. The danger limit is reached in the high-potential lines, not in the step-up and step-down transformers. Transformers can be built and operated safely at voltages far beyond anything ever thought of for power transmission. Only a few months ago Mr. Steinmetz was able to reach, by stationary transformers, a potention of 160,000 volts effective, or nearly a quarter of a million volts maximum—by the way, probably the highest alternating voltage ever experimented upon by man, if we leave out electrostatic charges and oscillatory discharges as limited power phenomena, while in his case he had practically unlimited power—a 100 kilowatt motor—behind the 160,000 volts. In line insulators considerable progress has been made, and insulators can now be secured which will not be pierced below 50,000 or 60,000 volts effective alternating potential in dry weather. When damp, in fog or rain, a considerably lower voltage will leap or creep over the insulator surface and thus short-circuit the line, and this brings us to the real limitation of transmission voltage which exists at present—the climate. In a perfectly dry climate Mr. Steinmetz would not hesitate to consider 20,000, or even 30,000, volts quite safe, while in a very damp and foggy climate, in rain and sleet, half this voltage may be decidedly unsafe.—Cassier's Magazine.

Magnetized Watches.

In this age of electricity and electrically-propelled machinery, the wearers of watches are constantly coming in contact with sources of danger to the fine time-keeping qualities of their vest-pocket companions.

Non-magnetic watches are those in which the balance-wheel, hair-spring, roller-table, lever and 'scape-wheel are made of metals which are neither magnetic nor diamagnetic; and such watches have been brought to a high degree of perfection, some having been produced which have had nearly as close a rate as the best of those which are not non-magnetic. In addition to this, several varieties of anti-magnetic shields have been placed on the market, which are said to be more or less effectual in preventing magnetism in watches.

However, in the ordinary watch the hair-spring, roller-table, lever and 'scape-wheel are made of steel either wholly or in part. A watch of this kind will become magnetized by being brought in too close proximity to a powerful magnetic field, such as is developed in a dynamo or a motor.

It will be seen that as all the steel parts of the watch become permanent magnets under the conditions mentioned, each steel part thus assumes definite polarity and tends to place itself in a north-and-south position like a compass. Moreover, each steel part attracts and is attracted by, and repels and is repelled by, every other steel part in the watch.

The influence of these magnets, one on the other, and the influence of the earth's magnetism on the several parts, seriously impede their freedom of motion, thereby affecting the rate of the

watch, sometimes even causing it to stop.

A simple method to detect the presence of magnetism in a watch is to place a small compass (one with a very fine sensitive needle about 0.8 centimeters in length) directly over the balance-wheel and upon the "bridge" which supports it. If the needle oscillates, it is evident that the watch is magnetized. However, this test is not conclusive, as the hair-spring may be magnetized, and, under certain conditions, the needle will not show it.

Demagnetizers of various construction have been contrived, but none will thoroughly demagnetize all the parts of a watch unless the watch be taken apart and each steel piece submitted separately to the action of the demagnetizer, testing each piece each time it is passed through the machine in order to ascertain to what extent the magnetism has been removed, and again passing it through the helix in another position if it be found to still contain magnetism.

Mechanical Progress.

A Novel Use of Cast Iron.

Diamonds are used in dressing diamonds; steel is employed in finishing steel, and an Eastern shop has made the innovation of using cast iron lathe tools for cutting wrought iron, cast iron and brass. This may seem absurd at first, but upon reflection we know that cast iron can to a certain extent be tempered by chilling. Being thus made harder, it bears the same relation to ordinary cast iron, which is comparatively soft, that one grade of steel does to another. It has been found that tools cast of a chilling mixture, with that part of the tool which performs the work chilled, will work better than the same tools made of steel, at least the shop making a practice of employing them finds that the workmen prefer them, which in itself is a recommendation that would not be given without being backed up with reason.

As many of our foundries are operated in connection with machine shops, it would take but a small outlay to test the claims of the efficiency of cast iron for this purpose. It is said that these tools, while proving superior on the softer metals, are unsuitable for working steel, a statement we can readily understand when we consider that the weakest metal must give away. The readiness with which tools of different shapes may be made, and the general cheapness of the process, are the advantages claimed. A careful investigation may prove the extent of their merit, something that may not have been thought of before.

Why American Machinery Leads.

American makers of machine tools have long been active and formidable competitors in the markets of Europe, but the recent invasion of England with tools for making bicycles has caused alarm. Many special tools were exhibited at the recent National Cycle Show and attracted much attention because of their accuracy, their efficiency and the ingenuity of their design. One of our English contemporaries, says the *American Manufacturer*, devotes several pages in two different issues, to descriptions of some of these tools, and says that the Americans are reaping a rich harvest by selling, pretty well at their own price, special cycle-making tools which cannot be bought of British makers. The editor undertakes then to explain why the American has shown so much more promptness and originality in seeing and meeting this demand. He thinks it evident that the English mechanic could have made the machines if he had thought of them. But why did he not think? That seems to be largely a sociological matter. The control of English works, making machine tools, is largely in the hands of prosperous men who send their sons to schools where mechanical ingenuity is unhonored and where the important knowledge seems to be the politer branches of learning. The young man so trained passes a little time in the shops, where he sees designing entirely in the hands of subordinates, and where the notion is confirmed in his mind that designing is a subordinate part of the work of the concern; and so he gradually takes the business control of the establishment with such theories well fixed in his mind.

In order to give to projectiles of steel or steel alloys a special hardness at certain places, at others and in the interior a special tenacity, they are heated, according to Louis Grambow of Berlin, at the places to be hardened to a bright red, corresponding to the hardness desired. The other parts are heated only to such a degree of red as to preclude their hardening in the subsequent tempering process. This treatment may be preceded by a heating of the whole projectile to a shade of red not sufficient to cause a hardening and a tempering of the whole projectile in order to make it tough throughout. Both treatments may be preceded by a hardening of the whole projectile by heating until the crystalline structure disappears, and then tempering all over afterwards. In partial hardening the projectile can be subjected to the different temperatures in a furnace by covering the parts to be least heated with sand or clay, or heated gas currents can be used for heating the single parts, the flames playing through open spaces in a flask enclosing the projectile.

DR. DEKARMET, the eminent Russian lecturer, who is at Vancouver, B. C., to give addresses on Siberia and its prospects, declares that with the opening of the Trans-Siberian railroad there will speedily follow direct and rapid steam communication between Vladivostock and Vancouver. This would place British Columbia in an all-around-the-world route that could be traversed in forty days. Dr. DeKarmet expects the Canadian Pacific railroad to join in the work of developing this great route by land and by sea. He predicts that with the opening of the railway there would come such vast gold development in Siberia as would make that country one of the greatest gold producers in the world. Even now, with but primitive appliances and methods, it produces in the neighborhood of $29,000,000 in gold yearly.

THE Schenectady Locomotive Works are building engines for the Northern Pacific railroad which will be the largest locomotives ever constructed. Some of their features are: Cylinders, 23 by 34 inches, 30 inches stroke; boilers, 72 inches in diameter at the smallest ring next to the smoke box; five driving wheels on each side; working weight, 100 tons. The fire-box sheets, 123¾ inches by 73¾ inches, and half an inch thick, had to be made in two pieces, with a lap joint.

A COMMISSION sent out by the German Government has made a report in which American and German railroads are compared, with little favor to the latter. There is nothing in all Europe, the Commission reports, to equal in running time and comfort the service between Chicago and New York. Comparisons of rates, arrangements of equipment, and accommodations all show in favor of our roads.

THE North German Lloyd line has in course of construction and remodeling steamers amounting to 70,000 registered tons. Seven ocean steamers are building and one remodeling, and a number of tugs are in course of construction. The largest of the ocean steamers will have 13,800 registered tons, another 12,500, and three others each 10,500. The work is all being done in German shipyards.

WHEN the Union Pacific was built the company paid $130 a ton for its iron rails, delivered at Omaha. Last week it purchased 30,000 tons of steel rails, to be delivered at Omaha, for $18 per ton.

Practical Information.

Reckoning Time Simplified.

Deputy Etiennes intends at the next meeting of the French Chamber to offer a decimal subdivision of time for universal adoption, as described some time ago.

The day is divided into 10 hours, the hour into 100 minutes and the minutes into 100 seconds, making 1000 minutes, or 100,000 seconds, per day.

The hour hand always points in the direction of the sun. Consequently, as the day begins and ends at midnight, the hour hand points downward, as also do the minute hand and second hand, at the exact time of the change of day, or 10 o'clock. Thence it rises with the sun in its apparent motion around the earth, points to the zenith at noon, after which it descends until it reaches its extreme lower point again at midnight. Thus the hour hand makes but one revolution around the dial each day. It is then the figure X on the dial at which the hour hand commences and ends each day, the minute hand each hour and the second hand each minute.

The time indicated by the decimal clock is always positive time. While 6 o'clock A. M. is represented decimally by 2:30 o'clock and 6 o'clock P. M. is represented by 7:30 o'clock, noon is represented by 5 o'clock and midnight by 10 o'clock.

It provides a standard time for the entire globe. It is proposed to divide the terrestrial globe into 1000° of longitude, corresponding with the 1000 minutes of the day, and by grouping them into twenty sections of 50° each establish standard time for the whole world.

Giving to Greenwich, where the counting of the meridian begins, the midnight meridian, and making it 1000°, the twenty sections would all be reckoned east of Greenwich and all the way around the globe.

It is said that this decimal system of time originated in America, being the invention of a United States citizen, although probably the French will be the first to recognize and adopt it.

A New Metal.

Wilfred van Wart, Franz Popp and J. J. Bradley, Birmingham, England, after several years of experimenting, have discovered a new silver-colored metal of beautiful appearance and of great strength. Mr. F. W. Burstall, professor of civil and mechanical engineering at the Mason's Science College, Birmingham, has elaborately tested tubes made from this new metal, upon the results of which tests the inventors claim that their new metal, which is to be called "vestadium," is very much stronger and of far greater utility than any other metal of the same specific gravity at present known. Vestadium is an alloy of aluminum, with a specific gravity of 2.73—that is, about one-third the weight of steel of the same volume—and is, therefore, of about the same specific gravity as pure aluminum, which is the lightest metal in mercantile use.

The following is one of the tests made by F. W. Burstall: "A tube, 12 inches long, was fixed with one end against a support and pressure applied to the other end; the tube only commenced to yield when a pressure of over 4800 pounds had been applied, and was only very slightly crushed at a pressure of more than 5000 pounds. One of the great advantages which these tubes possess is that they never snap. In the whole of the twelve tests made the metal was found to be homogeneous, and in every case the fracture was clean and silky. Vestadium is non-corrosive, the atmosphere and water take no effect upon it, and sulphuric acid does not even mark it. In color it is whiter than silver and takes a magnificent polish which never tarnishes and requires no cleaning. It can can be used with the greatest advantage in all trades, and for articles for outdoor and household use it is specially suitable, as it requires practically no cleaning, which is, of course, a great saving of labor.

THE cutting of ice in Wisconsin for market is described as follows: A field of good ice, the thickest, cleanest and purest on the lake, is selected at the start for domestic use. This is then "laid off," and next the snow is removed by immense iron scrapers. It is then scored by horse power into squares which will produce blocks, or cakes, nearly 2 feet square, each weighing 225 pounds. A team of horses, drawing a sharp, thin ice plow, then goes over the field, following the scored lines and cutting into the ice to a depth of 5 or 6 inches. A heavier plow follows, making the cut 10 or 12 inches in depth. Then, by means of long saws with double handles on one end, workmen go over the same field, sawing entirely through the ice at distances of 12 or 16 feet, as desired, and to the width of four marked cakes. These large sections of ice are then taken charge of by a crew of men under a foreman, and with long, hooked poles the men "steer" the sections toward the channels of open water which lead to the ice houses, channels which are in some instances a mile or two long.

THE most prominent feature of the metal markets for several years past has been lowering prices, but in no line has this tendency been more strongly shown than in the aluminum trade. A look over the prices quoted for some years past shows surprising figures. Throughout 1893 No. 1 98 per cent aluminum in ton lots sold for 75 cents per pound. A year later the price dropped to 65 cents and in 1895 the price quoted was 58 cents. Last year 50 cents per pound was the average figure, but since the opening of 1897 a decided lowering of rates has occurred.

A WATER-TUBE jail is one of the latest achievements of ingenuity. It is no longer necessary to make the prison bars so heavy and so hard that cutting through them becomes very difficult; but, instead, they are made simply of pipes, forming part of a high-pressure water system. Should any of these pipes be severed, the water would escape and quickly give warning of the break.

AN expedition is to be sent out shortly to northeastern Asia and northwestern America. M. Jessup will pay all the bills connected with it, which during the six years of its continuance will aggregate $50,000. F. W. Putnam of Cambridge, Mass., has the general direction of the expedition, which is to determine whether or not the primeval American Indians and Esquimaux came from Asia originally.

AN explorer says that the Missouri's source is at the crest of the Rockies, 8000 feet above sea level, just within the boundary of Montana. The stream is two feet wide and two inches deep, its water coming from melted snow. The source is 4221 miles from the Gulf of Mexico and 2945 miles from its confluence with the Mississippi, making the river the longest unbroken current in the world.

THE earliest discovery of iron within the present limit of the country was in the mountain range of western North Carolina, and the first effort to manufacture it into merchantable form was made in the State of Virginia in 1619. The foundry was destroyed by the Indians in 1622.

GOOD sponges have steadily grown dearer of late years, and now the Cuban insurrection cuts off one source of supply. Since the rebellion so many of the fishermen are forced to serve on board ship that there are few left to go fishing.

THE French Minister of War lately offered a prize for the swiftest bird in a flight from Perigueux to Paris—310 miles. There were 2746 entries, and the winner did the distance in seven hours and thirty-four minutes.

Mining Summary.

CALIFORNIA.

Amador.

Dispatch: The Union Consolidated gold mine has not closed down. At the suggestion of Supt. Bibo all the men working in the drift and stopes were laid off and more men put in the shaft. The intention is to discontinue work in the drifts and sink on the ledge 300 feet which will make the shaft 830 feet deep.

At the Bellwether a small force of men is keeping the water out, and in running north along the ledge at the 280-foot level. It is expected that the full force of men will be put on soon again and that the shaft will be sunk to a greater depth.

Under date of March 13th, Louis C. Tetard, secretary Bellwether G. M. Co., writes from Chicago, stating that the item concerning the company's business, which appeared in this column on the 6th inst., was incorrect. He says that no man in the employ of the company was ever told that he must buy 100 shares of stock at 25 cents per share; that no stock was so issued, and no money thus retained. Mr. Tetard states that he owns and represents nine-tenths of all the company stock, that none of this is on the market at any price at this time, and has not and will not be advertised for sale.

Republican: There is no doubt that the erection of a 40-stamp mill will be commenced on the Argonaut as soon as the weather settles. The mine is looking remarkably well. The ore body has been penetrated and to some extent prospected on three levels—namely, 1150, 1250 and 1350.

Record: At the American mine on Sutter creek the new stamp mill was started last week by Wilifred Dennis. In the bottom of the 70-foot shaft the vein is 8 feet wide.

Work has been resumed at the Black Prince mine, Mount Echo district, and the machinery has arrived. Machinery for the Leona mine in the same district is on the road.

Butte.

Mercury: At Magalia a new and promising enterprise is the Bader mine, one and a half miles southwest of town. It is a location on an ancient river channel, and the company own 110 acres. The channel beneath a lava capped mountain 500 feet high is being developed by a bed rock tunnel which was run 800 feet before gravel was struck by raising twelve feet. The channel is believed to be in the neighborhood of 200 feet in width, and where breasted out, is about 3 feet deep.

The Gold Bank mine at Forbestown is a large ledge of low-grade ore, but by a systematic system of working, and a complete and extensive plant for reduction, has paid dividends quite regularly—notwithstanding the immense amount of dead and developed work which has all the time been prosecuted, since it was started. The hoisting, pumping and milling is done by means of water power, using 150 inches under about 200 feet pressure.

The Golden Queen, an adjoining mine has been leased by the Stow Company, from which the rock now being worked is extracted, while the development work in the lower tunnel is being made.

Three miles west of Forbestown, on the South Fork of the Feather, J. Chamberlain is superintendent of the New Oregon, for a San Francisco company, and is meeting with flattering prospects. The ledge is 12 feet wide.

On the hill above Forbstown is the Burlington Consolidated, owned by Ralston & Co. of San Francisco. A drain tunnel has been pushed ahead for some distance on the vein, and at the face of the ledge is 10 or 12 feet in width.

The Missouri ledge, a mile north of town, has been bonded by a Texas company, and is being prospected under the superintendency of Mr. Stow of the Gold Bank.

In the Carlisle mine, northeast of town, the vein is large and carries a heavy percentage of high-grade sulphurets. It has a 5-stamp mill. In the same claim there are two other large veins, yielding a good grade of quartz. The owner is now engaged in preparing for extensive work this season.

Hampton & Martin own a ledge two miles southeast of town, which, with a shaft 40 feet deep, shows a 4-foot vein.

There are thirty-three drift mines in Butte county, sixteen of which are being worked more or less extensively, employing in each from one or two to eighty men.

There are forty-five quartz mines, partly or extensively opened. Of this number thirty are working, employing from one to 110 men.

Calaveras.

Prospect: At the Big Six mine in Salt Spring valley, owned by D. L. McAfee, W. K. Dean, R. N. Dean, J. McAfee, P. S. Dean and Chas. McCoy, two shafts have been sunk, one about 10 feet and another 40 feet, and the vein is 14 feet in width between the two well-defined walls.

The working tunnel which is being run by the Exploration Company in the Gottschalk mine has connected with the crosscut and the latter is being enlarged to the size of the tunnel. The crosscut is about 80 feet long, and as soon as it is enlarged to correspond with the working tunnel, sinking on the vein will commence.

Chronicle: At the Gwin mine the 40-stamp mill is running night and day and crushing at the rate of 115 tons every twenty-four hours. The lead at present is from 8 to 10 feet wide of an excellent quality of ore. There are at present eighty-four men employed in and around the mine.

Mountain Echo: A rich chute of ore has been discovered in the Bald Hill mine at Albany Flat, owned by Fred Brunner. Mr. Brunner was about to bond the mine to parties when the discovery was made, and thereupon changed his mind.

A corps of engineers has made a survey of the north shaft of the Ford mine at San Andreas, with a view of connecting it with the south shaft.

Active operations have been resumed at the Green Meadow hydraulic near Glencoe by W. Clark. The claim comprises sixteen acres.

The Fellowcraft mine will start up with a full force of men. The revival of the operations at this mine is regarded as an important proposition by those interested in mining. It was opened last spring under favorable circumstances. A 10-stamp mill was erected and the prospects for a good mine were encouraging. After a short time operations ceased and the property has remained idle up to the present time.

The Rose Hill Hydraulic Mining Company, recently incorporated in San Francisco, will work the Rose Hill mine.

El Dorado.

(Special Correspondence).—The Point Lookout mine, situated five miles south of Shingle Springs and twelve miles west of Placerville, was sold last week to Bassett & Smith, of Pomona for $60,000, of which amount $20,000 are payable in sixty days. The ledge is 15 feet wide at a depth of 50 feet. The ore averages $8 in free gold and $150 per ton in sulphurets. There is a 4-stamp mill on the property.

The tunnel on the Lloyd mine, one-half mile from the Court House, has reached 135 feet. It is 5x6½ feet in the clear. The work has crosscut the formation of a ledge 20 feet wide, of which 8 feet are mineralized. The formation is locally known as greenstone. Power drills and systematic efforts are accomplishing their work very rapidly.

Meyers & Morrow, three-fourths of a mile north of town, are working successfully on the Lucky Star, which joins the Gentle Annie property on the east. They have a shaft 35 feet, tunnels 240, and open cuts 160 feet in length. The ledge averages 2½ feet, and is a porphyry quartz. The general average of the ore is $20 (with very rich sulphurets), but from this rich specimen ore is hammered in a mortar, so rich that its quality was beyond belief had the writer not been an eye witness.

A visit was made last week by your correspondent to the old Skinner, Noyes & Lemmon property, now known as the Empress Josephine mine. It is less than half a mile from the court house. The tunnel has reached 245 feet. The drift to the north has reached 15 feet on a ledge 14 feet wide, the opposite wall of which has not been reached. The gold was plainly visible, not less than 15 ounces being taken out with pick and gad within half an hour, and what clung to the quartz was gathered on a canvas spread across the bottom of the tunnel. It is argued by some that this must be a pocket proposition exclusively, yet it should be borne in mind that the ore is all gold bearing, and will average above $8 (free milling), and from $100 to $150 per ton in sulphurets. The slate, as well as the quartz and porphyry, carry gold, visible without a glass. For years this property has been gophered, and yielded a large amount of gold, but now system and depth are proving that a good mine is in reserve. El Dorado county is now being rapidly redeemed from its dormant state.

Placerville, March 16th, '97.

Nevada.

Transcript: Some very rich quartz has been struck on the 600 level of the Pittsburg mine by tributers. Twenty men are at work there.

Charles Bell of San Francisco and W. H. French of San Jose have purchased the old Crumbecher mine in Washington district and intend putting up a mill as soon as the snow goes off. The average of all the samples taken for 53 feet in width was $5.40 per ton, and the sulphurets assayed $50 per ton.

Prof. Treadwell has received a letter from London capitalists who have been considering the big tunnel proposition from the South Yuba river to the Nevada City and Grass Valley mines, in which they state they must have all the Gold Bank Tunnel interest and the control of the Grass Valley Railway & Tunnel Company. They want to consolidate to forestall any opposition. If reasonable terms can be arranged, they contemplate the purchase of some desirable gold mining properties along the line.

Placer.

Sentinel: J. G. McCloud, of Clipper Gap, has bonded his Big Lead quartz mine on Rich Flat, near Auburn, to Joel Smith for $20,000. The life of the bond is eighteen months. Mr. Smith has engaged four miners and will immediately commence to sink on the ledge.

Argus: At Blue Canyon the Van Avery mine has been closed down for the time being, the snow having shut off the water supply which operates the mill.

The Azalea mine is running in full blast.

The Redstone mine was closed down for a short time.

The Haub mine, in Shady Run district, is shut down on account of too much snow.

The old Mountain Gate mine is being slowly opened up. Five men are engaged in retimbering the old gangways.

About a dozen men have been laid off at the Pioneer mine.

Herald: At the Marguerite mine they are now running a perpendicular shaft from a drift to the surface, and when the top is reached, a distance of 300 feet, they will go down again and enlarge and timber the shaft which they intend to sink 1000 feet. A hoisting works will also be erected.

Plumas.

National Bulletin: At Greenville, Standart & McGill have several men employed in their big mine near Round Valley. As soon as the snow leaves they will put on a larger force, begin the hauling of ore and resume the operation of their mill.

One of the big mining operations in this county now is the Plumas Imperial hydraulic mine, owned and operated by C. D. Hazzard, of Minneapolis. Since the 20th of February, two monitors have been running night and day continuously, and doing good work. The supply of water is plentiful, and will be for many months.

Sam Firmstone and associates are doing development work on the Phœnix, at the head of North Canyon, and expect soon to cut the ledge.

Shasta.

Democrat: Bell and Scranton are getting out some good ore from the Oro Fino mine they recently bought from A. K. Fitch, and which was formerly owned by Judge Sweeny.

Conroy, Hull and Murray are shipping ore from their mine four miles north of Shasta to the smelter at Keswick.

C. E. Brown and many others are also shipping ore to Keswick. The deadly fumes from the smelter are beginning to tell on the timber near Shasta as well as along the Sacramento river. For quite a distance north and west of the town the hills are covered with dead trees.

Siskiyou.

Journal: The Brown Bear quartz mine, of Salmon river, owned by Golden & Eveleth, has been sold to G. W. Grayson of Oakland, Cal. It will be worked upon an extensive scale as soon as preparations are completed.

The Chinese company, just above the mouth of Humbug creek, in Klamath river, have their wingdams and wheels ready to commence work, except the dip wheel for the sluices, which is now being built.

The Greenhorn blue gravel mine will soon be open for hoisting pay gravel, as the shaft is now down about 90 feet, with expectation of sinking 15 or 20 feet more to reach bottom of bedrock.

Lively times in mining may be anticipated during the coming spring and summer around and near Yreka. The old Espy claim and pumping machinery is now in successful operation under control of Hunter and Simmons, who have already piped off more than an acre of ground, since starting their mammoth pump at Shasta river. Several good claims have been located on Shasta river below the electric light plant, in Fool's Paradise district, and all the old claims are to be worked with renewed energy at Hawkinsville, Long gulch, Canal gulch and other localities north of town. On west side of town several claims will be worked on Humbug gulch, Greenhorn gulch, Portuguese gulch, Spring gulch and other gulches, while south of town, the rich claims on Greenhorn creek are being opened again.

Reporter: S. J. Fore has purchased a sawmill and five stamps to be added to a 5-stamp mill now being moved to his mine. The present tunnel now shows 40,000 tons of ore in sight. Mr. Fore will also have his mine at Callahans running by the 20th inst., where thirty men are now employed.

News: Ed McNulty is surveying a ditch from near the electric light plant, extending four or five miles down the Shasta river to rich placer ground he has located, which lies on both sides of the river.

Under the new arrangement the Ball mine in Klamath mountain will be started up soon with its 20-stamp mill.

Sierra.

Enterprise: Last week fine appearing blue colored gravel was struck in the latest upraise of the North Fork drift mine. The boulders encountered are large and well washed. Pretty gold specimens, some rather heavy, were picked out of the gravel near the bed rock. Quite a number of miners are employed and the future success of these old-time diggings is now assured.

The Bald Mountain Extension's north tunnel, being run for the channel northeastward, was in 432 feet last week. This only leaves 413 feet more ahead to reach gravel in upraises Nos. 15 and 16. The rock in the face of the tunnel is very soft and over 40 feet is the weekly (six days) progress, with two ten-hour shifts working.

Should the Plumbago ledge continue to pay well, a telephone line will be put up to connect with that of Alleghany and Forest City.

The mining outlook at and in the vicinity of Alleghany is again brightening.

Trinity.

Free Press: The Trinity Mining and Milling Company, having its office at 56 Nevada block, San Francisco, has been incorporated, with Charles H. Fish as president and J. Stadtfeld Jr. secretary. The properties to be operated are the Trinity Consolidated mines in Dog Creek mining district. It has long been known that these mines possessed great values, but for want of sufficient capital and machinery have heretofore been worked in a desultory manner. In the early 60's this camp produced great quantities of placer gold, but until lately quartz mining has not received much attention there.

Journal: The Pelletreau claim, at Taylor's Flat, 400 feet above the river bed, comprises about sixty acres of rich gravel. At present it is running night and day, and gives employment to eight men and pays $500 a week.

The Don Juan mine, situated about three miles above Burnt Ranch, operated by Mr. G. W. Huestis, is paying well.

At East Fork the Enterprise company are running their mines and crushing ore from the Lone Jack ledge with good results. The North Star mine is being run, and the ore crushed in the 10-stamp mill on that property. Nicholson & Cleckner are taking out quartz from the Poorman mine and having it crushed in the Enterprise mill.

Tuolumne.

Union-Democrat: Work on the Marlow mine, near Summersville, is being prosecuted vigorously. This is a gravel claim and indications are that it is rich. Twelve men are employed.

The Trio is being driven down by Acting Superintendent Munger, although progress is rather slow owing to the extreme hardness of the rock. The shaft has reached the 120-foot mark and on arriving at the 200 the vein will be crosscut and a level run.

At the Dutch a strike of rich quartz was made in the drift on the 300-foot level Sunday.

The Sailor mine, a Table mountain proposition, owned by Kent & Dick, is in the main channel, with 700 feet of tunnel, and sending out blue gravel which pays well.

A 5-foot vein of rich ore has been uncovered in the Norwegian mine, near Robinson's Ferry. The mine was recently purchased by H. F. Emeric of San Francisco and others from the Lawsons, whom it has made independently rich. Frank Enzensberger was placed in charge as general manager and under his directions work on the property has progressed rapidly.

On the Golden Gate they are driving the 200 level northward into the hill to reach a large pay chute which, from surface indications, exists in the upper claim of the group. The chute on which the mill is running is over 650 feet long and the mine opened to a depth of 700 feet. No ore has been extracted below the 500 level and it is said that the reserves still in sight above that level are sufficient to supply the mill for a long time. The number of men employed is about seventy-five. Mr. Jacob A. Fischer, the general manager, is at present personally superintending affairs at the mine.

NEVADA.

Dayton *Times*: Rapid progress is being made on the Davis leaching plant. It will consist of five large redwood tanks, 20 feet in diameter and 5 feet deep, and two redwood settling tanks, 16 feet in diameter and 8 feet deep. The plant is so situated that the material to be worked will be hauled onto the runway over the tanks and dumped through screens into the tanks. When the material has been treated the solution will be drawn off into the two 16-foot tanks and the waste will be discharged through a flume, under the Rock Point ditch, into the river below the dam. The plant will be of a capacity to handle between fifty and sixty tons of material a day.

It has been found that the Douglass ditch will have to be enlarged some 2 feet to furnish water enough to give sufficient power for the Peck plant which is to be put in here. To enlarge and clean the ditch thirty men have been employed, and work will begin immediately.

OREGON.

BAKER COUNTY.

The Virtue, the oldest mine in the district, was discovered in 1864, and has the credit of producing over $3,000,000 in gold. The mine was developed to a depth of 700 feet, the ore now going to the mill coming from 300, 470 and 600-foot levels. It is the intention of the company to put in twenty more stamps this season. The new hoist and pumping plant, just installed, have a capacity for developing the mine to a depth of 2000 feet. The main pay chute is 800 feet long, and averages 3 feet in width.

The Consolidated Virginia is the southern extension of the Virtue. The shaft is now down 415 feet, and in very hard diorite. It is expected that forty days more will be used up in the shaft before they are ready to crosscut for the lode.

The Flagstaff, northeast of the Red Jacket, is in the same ore belt. This mine, owned by a French company, has a fine steam hoist, eight compressed air drills and plant, and has just finished a 10-stamp steel mill of the latest improved pattern. The shaft is now down 550 feet, and will be pushed to a depth of 800. Drifts have been run at the 100, 200 and 300-foot levels, exposing an ore chute from 200 to 400 feet long and of good quality. The mill will be started as soon as the water supply has been increased a little.

The White Swan, three miles east of the Virtue, at this date is held by persons who are reorganizing the company, and hope to drive away the cloud that has hung over the mine so long. The mine has a record of over $30,000 in gold, all from above the 240-foot level.

The Columbian mine is two miles northeast of the Virtue. The incline is down 225 feet, and the ore has been drifted at the 100 and 200-foot levels. The steam hoist has a capacity of 800 feet. Here it will be necessary to sink for water, and a 10-stamp mill will be erected as soon as water is reached.

The Mabel mine is 2½ miles southeast of the White Swan. The ledge is from 1 to 6 feet wide, and from one pocket there was taken some years ago $24,000. No work has been done for some time.

BRITISH COLUMBIA.

(Special Correspondence).—In a short time an act will have passed the Provincial Legislature making it compulsory for a mining company incorporated after that date to put up 10% of the capital stock of the company in cash. For this reason in the past two weeks eighty-two mining companies have been incorporated with an aggregate capitalization of about $65,000,000. This brings the total capitalization of British Columbia mining companies up to over $500,000,000, and a very small proportion of this represents actual cash investment.

Trade centers are commencing to feel the injurious effects of over-speculation in stocks. Many business men of small means have exchanged available cash for stock not profitably negotiable just now, and collections are very slow in consequence, while in the rural districts it is impossible to collect even a small percentage of taxes due owing to moneys available being appropriated for mine investments.

No less than three mining towns are being sold by sections in Vancouver. All are in a very incipient state as yet, but bid fair to become settlements of importance. They are Channton on Phillip's Arm north from Van-

couver, near the Channe Mining Company claims, recently sold to an English syndicate, Cachton, near the famous Golden Cache mines of Lillooet, and Fairview, about a mile from Fairview camp, Okanogan.

Five syndicates in all have asked permission under certain conditions to build a smelter and refinery in Vancouver. Four of them want big bonuses ranging from $100,000 to $150,000, but an English syndicate offers to build a smelter and refinery, expecting no more inducement than free city water and tax exemption. It is altogether likely that the English syndicate, being the lowest bidder, will build the smelter.

The Aurious, Marguerite and Nanaimo claims in Lillooet, near the Golden Cache group, have at last been put on the market, having been acquired by the Lillooet Gold Reefs Company. The mines have been capitalized for $200,000, and shares are selling at 25 cents par. The ore is free-milling and resembles the Golden Eagle ore. Assays from the surface run high in gold.

Every one is anxiously looking forward to the issue of the first dividend from Seaboard mines. Several of the mines from Vancouver's very door to within a radius of 300 miles have been shipping ore, but none of them in large quantity. From the result of the work at the Alberni Consolidated, Vancouver island, however, there is every indication that the coast proper will soon have a dividend payer. A stamp mill has been running night and day, and, according to report, the ore turned out $50 to the ton from rock taken at random across the lead. This week ten tons of ore were shipped to San Francisco to have it properly mill-tested, and, should the result be favorable, a 20-stamp mill will be erected.

The Dominion Developing Company shareholders have decided to reduce the capital stock of the company from $500,000 to $22,500. The move is a very popular one in these days of over-capitalization.

The latest excitement is caused by the location of large numbers of promising gold and silver claims in the neighborhood of Pitt and Harrison lakes respectively, and within easy reach of New Westminster and Vancouver via the Fraser river. At Pitt lake fifty prospectors have located over 100 claims and many of the first assays show rich in gold. Access is cheap and easy by water to the Everett smelter, to which the mines will probably ship most of their ore. Several will begin shipping in early spring.

The mountains around Cayoosh creek, near the Golden Eagle, are being scaled by hundreds of prospectors who are staking claims in the snow. The country is all staked out within a radius of several miles from the now famous Golden Cache mines. The reputation of this camp is now so widespread on account of the Golden Cache mines that numerous companies are rapidly being formed to procure and take up claims now on the market. Among the best companies organized is the Lillooet Gold Fields Mining and Milling Company, organized to develop the Aurious and Marguerite claims, near the Golden Cache group. The capitalization is low—$200,000. The ledges on the claims owned by this company have been stripped in several places and average assays from the surface run about $15 in free-milling gold, with every indication of improvement.

The owners of the Van Anda mine, Texada island, are well satisfied with the latest reports from the workings. The 110-foot level of this Texada island mine has cut a vein showing rich peacock ore, and on the 70-foot level the ore continues well defined and much stoping is being done, there being considerable ore now ready to ship. Sixty tons will be shipped at once to the smelter. Meanwhile the Raven, two miles from the Van Anda, is showing fine peacock ore at the bottom of the shaft and the Victoria has a shaft down 70 feet and the ore continues well. The mines on Texada island are now attracting general attention to the coast. Texada has for long years been known to be richly mineralized, but only recently have attempts to exploit its ores materialized. Now prospectors have located very many promising claims all over the island.

The Queen Bee and Bully Boy claims on Valdez island, which are being worked by a Vancouver syndicate, show encouragingly. The shaft on the Queen Bee is down 34 feet, where average assays show $43 a ton. The ore carries gold, with a trace of silver. On the Bully Boy a tunnel is in 60 feet, showing ore similar, but not quite of such good grade, as in the Van Anda case. There are sixty tons of ore on the dump.

The Fairview Consolidated Quartz Mining Company, Limited, incorporated for $2,500,000, will acquire the Reco, White Swan, Quartz Queen, California, Standard, Nightingale, Ocean Wave, Sundown, Ironclad, Fannie Morris, Silver Bow and Rob Roy claims in the Fairview camp. Of this and several other Fairview mining companies Mr. A. A. Davidson of Victoria will be the managing director. There will undoubtedly be large developments in the Fairview camp this year, although until recently development has been comparatively slow.

The iron ore of Nanaimo and Texada island has been but little worked yet, and this only for the supply of blast furnaces at Port Townsend, Wash., now closed down. It is, however, now hoped that, in conjunction with the coal of Nanaimo, the working of this iron ore may be resumed, in connection with iron blast works within the Province itself.

Victoria, March 16, '97. GOODMAN.

Spokesman-Review: Sir James Grant of Ottawa has obtained R. C. Campbell-Johnson's option on the Exchange group in the Slocan. The option is said to be for $21,000.

Spokane *Chronicle*: A good strike has been made in the Center Star mine 200 feet from the Le Roi line. The main tunnel in the Center Star, which is almost 1500 feet long, reached the Le Roi several days ago. Manager Durant then began crosscutting both ways about 200 feet from the Le Roi line, where a good shoot of ore had been cut diagonally. The crosscut to the south is in 6 feet and shows no sign of the foot wall of the ledge. The crosscut to the north is now 24 feet long and shows no sign of the hanging wall.

The new air compressor at the Slocan Star has been set up and the drills are now cutting the remaining 450 feet the No. 5 tunnel has to reach the vein. When completed the tunnel will be about 900 feet in length and about 600 feet from the surface. The mill is turning out thirty tons of concentrates daily. The monthly pay-roll shows an average of over 100 men employed at the mine and mill.

On Pass creek, a tributary of the north fork of Kettle river, the Pathfinder was bonded a short time ago by Parkenson & Peffer to English parties for $65,000. The shaft is down 30 feet and shows $21.50 in gold and about $10 in silver and copper.

ALASKA.

News: Reports have been brought from Funter Bay of the recent developments in the War Horse group of claims, in whose veins the telluride ore has been proven to exist. The ledge upon which the greatest work has been done crops out near the water's edge; in fact, is covered at times by the highest tides of the month. The shaft is now down to a depth of 44 feet, disclosing an 18-inch vein of exceptionally rich ore. Leading into the main ledge are numerous stringers varying in width from 2 to 8 inches and all showing the same general characteristics.

The Klondiek will not be the only scene of activity on the Yukon this season. The Birch creek diggings will turn out more gold than ever before, as many claims are now opened up for the first time, while the old producers are in a correspondingly further advanced stage of development and able to keep up the record established in years past. On Mastodon creek alone, which contains all told but fifty-two locations, about thirty-five claims will be worked continuously during the summer.

UTAH.

Tintic *Miner*: A strike of ore has been made this week in the Alaska shaft at a depth of 130 feet. The vein is said to be nearly 4 feet wide.

At the Centennial-Eureka C. E. Allen, with Superintendent Smith, is conducting a thorough examination of the property, and will, in short time, decide on the capacity of the projected mill. It is said of the Centennial-Eureka that already blocked out are ores that will keep the mill operating for several years, with 200 tons a day being put through. Meanwhile additional depths are being explored; practically no stoping is being done.

Salt Lake *Tribune*: At Park City stoping in the Daly has been resumed. The ore will be stored in the drifts, which are mostly empty, and the men will go to and return from work through Daly No. 2.

At the Anchor considerable first-class ore is being stored ready for shipment as soon as the roads will permit its being delivered at the Mackintosh sampler.

At Mercur the Marion has resumed work with the old force, and the usual amount of ore is being put through. At the Geyser between 97 and 100 tons are put through daily, and the crusher is not busy half the time. The mill will soon be treating the full 100 tons, and as soon as the weather moderates tanks sufficient to bring the daily capacity up to fifty tons will be put in.

The Wachussetts, consisting of two claims on Lion Hill, has been sold for $20,000, to Dern, Airis, Brown and Peyton.

Mammoth *Record*: The old Diamond mining property has been started up again.

The Mammoth Mining Company have their new hoist in position, and will start work immediately.

Eureka *Democrat:* For the past eight months a series of experiments has been made at the Eureka-Hill with a view of adapting the leaching process to the working of the ore being taken out of that property. The ore can be treated at a considerably less figure by this method than at the smelters, and will enable the company to work lower grade ores.

Mr. Schwarthorn sent out a force of men from Provo this week to work the Last Hope, which lies on Mineral hill, on the east slope of Godiva mountain.

Arrangements are being made for the incorporation of the Orient Mining Company, which will develop some promising properties in West Tintic.

Thomas Barrett put ten men at work on Monday on the Lily Consolidated.

A force of men will be put to work on the Valley View, near Silver City.

IDAHO.

Wardner *News*: It is not expected that the Helena-Frisco mine at Gem will be ready to start up full blast before the first of July. Nearly a hundred men are now employed in sinking, cutting out stations and other preparatory work. This property is being fitted with the most complete and up-to-date mining machinery in existence. Manager McDonald estimates that not over 120 employes will be required to operate the entire property when the work and improvements now in progress are completed.

The Frisco shaft is now down to the 600-foot level. Good headway is being made in the drifts. One hundred men are at work. No ore is being milled at present.

A new strike is reported on Moon creek, west of Osburn, on a property now under bond and lease to McCallum & Co. The ledge is good and strong.

The Tiger-Poorman Company has 135 men at work. Sinking is being done on the shaft, and the station for the 1200-foot level will be started soon. The mill is turning out about forty tons of concentrates per day.

The Standard is employing 140 men at the mine and mill. All stopes on the Campbell tunnel level show fine bodies of ore. About 250 tons are sent to the mill every day, and it is expected the mill will oe running full time soon.

MONTANA.

At the Mayflower, shipment of ore is going on at the old rate. The company has started a tunnel 300 feet below the old workings.

Lacasse Brothers, owners of placer mines in Cedar guich, have sent men to begin work. Last fall a new flume was completed.

The Iron Mountain company have a telegram from the superintendent at the mine that the lead had been cut at the seventeenth level. The Iron Mountain is now the deepest mine in Montana.

Inter-Mountain: The chemical laboratory for utilizing the smelter smoke of Butte bids fair to become an assured fact. R. H. Hornbrook, a competent chemist, has been in the city several weeks looking into the matter and making tests at the Colorado smelter, and it is understood that within a few days work will be commenced on a plant to be situated near the Colorado company's smelter.

The shaft of the Parrott company has reached the 250-foot level, where it is likely a station will be cut and crosscuts run to tap the ledges believed to exist in that locality. No ore bodies have yet been cut.

Miner: Encouraging reports continue to come in from the Horse and Park Canyon districts, and there are now probably more men at work in this section than ever before in its history.

Elmer Metcalf and others have been given a lease on the Grant Extension owned by the Anaconda company. They are now sinking and at the same time putting in machinery. It is the intention to sink 200 feet before crosscutting commences.

The Ajax Mining Company of Helena has come into possession of the Stray Horse mine in Jefferson county, taking up the bond given last year for $75,000.

At the West Colusa of the Boston and Montana, preparation is being made for placing a head frame and sheave wheel at the 600-foot level, preparatory to sinking to the 900-foot. The size of the shaft will be 9x17 feet 8 inches in the clear, wall plates 12x12 inches timber, end and counterpieces 12x14 inches. This will allow two cars to be placed end to end on each deck of the cage.

At the Moonlight, crosscutting on the 600-foot is in progress. The shaft is going down steadily, being at present about 750 feet deep. At the Poulin, the shaft is completed in the 1200-foot level, where a station is being cut.

Mining and Railway Review: The heavy fall of snow in the mountains insures an ample supply of water for placer mining the coming season.

The Jaw Bone and Queen Bee mines at Hassell have been sold by Angus McQueen, of Helena, to an English syndicate, who propose to put it on the London stock board at a par value of $1,000,000.

SOUTH DAKOTA.

Black Hills *Times*: At Ragged Top, F. M. Wall is working fifteen men on his lease on Balmoral lodes No. 6, 7 and 8. He has driven two tunnels, each about 75 feet in length, from which he has run two crosscuts and an incline to intersect the fissure veins which are known to extend through the property.

Dacey & Kilpatrick Bros. have temporarily suspended all work except that of sinking the main shaft, in which eight men are employed. The shaft is now down 270 feet.

The result of operations of the diamond drill on the Alaska group, owned by General Raum, is of interest. Though a depth of over 200 feet has been reached, there is as yet no change in the rock or formation.

At Keystone the shaft on the Holy Terror has passed the 500-foot level, and a station will now be made and a crosscut run to the vein. The rock through which the last 50 feet has been sunk has been softer than formerly, and there are other indications that an ore body will be opened on this level.

Baldwin & Co., lessees of the cyanide annex to the Keystone mill, are making a success in the treatment of tailings and concentrates, and propose to handle the entire dump. The European expert, who is to examine and report on the property for an English syndicate, is expected to be in the camp next week.

COLORADO.

Denver *Republican*: At Silverton the Hamlet, on Sultan mountain, has been worked all winter and has developed a large body of pyritous ore, from which shipments will be made when the trail is opened.

The Sampson mine will be started up in the spring with a large force of men.

The Shenandoah, which has been worked all winter, has a body of galena and copper ore 12 feet thick with only the width of the drift taken out. When shipments commence, it can be broken down in large blocks and will give employment to twenty-five men.

The Victoria has 180 tons of ore taken out in drifting 100 feet on the new ore body, which will be dropped down to the mill when the latter starts.

The crosscut tunnel on the Letter B at Gladstone is now in a strong body of fine-looking quartz and the advent of paying ground is looked for within 50 feet.

The Idaho group of mines, on Kendall mountain, has been bonded to an Eastern company and will be in full operation when the spring opens. The property is extensively developed by tunnels on the vein. When the lower tunnel is extended to the end of Idaho No. 2, it will have attained a depth of 2500 feet; and as the outcrop is on the summit of Kendall mountain, the immense value of this deposit can be estimated.

The 400-foot tunnel on the Red and Bonita Mountain mines has been completed and a new contract on the same property will soon be commenced. Drifting on the veins is progressing. Nine veins were cut, most of which were blind on the surface. The veins all disclose mineral, but the main vein aimed for will not be reached until the tunnel is in 1000 feet.

On the Gunnison belt at Ohio City the Raymond, owned by D. H. Moffat and Eben Smith, is developed by a 600-foot tunnel. The vein is 5 feet between walls, with a 2-foot pay streak.

The mines in the district have been idle for several years, as they produced only silver at first, and it was not thought that they carried gold to any great extent. Recent developments, however, have shown that the gold values are continuous from the rich lodes of the San Juan region in a general northeasterly direction to the neighborhood of Pitkin.

The Little Chief is developed by tunnel work 450 feet in length, and has opened a vein of ore 18 inches wide.

The mining district contiguous to Lawson, up to 1880, was one of the best silver camps in the Clear Creek district, and before the exodus took place it employed fully 4000 men in its mines on these mountains. For a long time but little has been heard of Lawson, yet there is a portion of the Silver Creek district that has kept right on producing ore.

The Two Sisters group also employs about forty men. There are three shaft-houses on the property, and ore of a high grade has been shipped from here for many years.

On the Georgetown road, west of the Millington, the Bellevue is one of the greatest producers in the camp. The shaft is down 400 feet and is being sunk deeper as fast as three shifts a day can sink it. It has recently been leased and bonded to a Denver company.

At Telluride the Japan is making regular shipments of high-grade gold and silver ore. New stoping ground is being continually opened up, and after the mill starts in the spring, when there is sufficient water for milling purposes, this property will be one of the largest concentrate and high-grade ore shippers in Savage basin.

J. H. Schofield, superintendent of the Duquesne Gold and Silver Mining and Milling Company of Pittsburg, has men employed driving a tunnel on a group of properties near Ames. It is now in 400 feet, with about 350 more to drive before intersecting a big vein carrying gold and silver, which is the objective point of the tunnel.

On the K. C. Humboldt, located on the same lead as the Smuggler-Union and Sheridan-Mendota, a force of seventy men is employed, and from six to seven cars of high-grade gold and silver ore are shipped out per week. The ore runs well in gold, and some of the shipments have netted as high as $2000 per car.

In the Freshwater district the Hub Hill Gold Mining Company, owning fifteen claims on Hub Hill, near Guffey, is sinking a 100-foot shaft and otherwise improving.

The new cyanide mill is running successfully and proving its ability to treat the ores of the district. Two more propositions are pending to erect milling plants of not less than 200 tons capacity per day.

The Missouri Mining and Milling Company at Manhattan has struck the vein in the Whadbee tunnel in the Monte Cristo mine and find it 8 feet wide between the walls and well defined. The ore is apparently very rich. It is composed of sulphides carrying both gold and silver.

Reports from three mills treating Cripple Creek ores show 6500 tons handled by them during February. The Colorado-Philadelphia chlorination workings treated 3700 tons of an average value of $25. The Brodie handled 1387 tons, the extraction averaging less than $22. The Gillett chlorination mill treated 1300 tons of a total gross value of $35,000.

In February the Anchoria-Leland produced 600 tons of ore of all grades, paying the expenses and dividends, besides adding to the surplus. All the ore came from the first level on the Maloney cross vein, which has now been followed for 300 feet without disclosing the end of the chute. The new cross vein opened to the south of the big shaft has been followed for 30 feet.

The tunnel run to the Republic vein from Mayflower ground has cut the vein in 448 feet from the mouth, tapping the ore chute at a depth of 150 feet.

Sinking has been resumed at the main shaft on the Grouse of the Bankers' Company. A station was cut at 230 feet, and drifts are being run into the ore. In about 25 feet farther it is expected the vertical shaft will catch the vein on its dip, and from there the work is to be carried on as an incline on the vein to a depth of 500 feet.

The Squaw Mountain tunnel is being pushed on by hand, and at 1600 feet in the hill has encountered a new vein from which good assays are being had.

The lessees on the Estelline on Howell Hill have opened a vein in the north end of the property, and at a depth of 20 feet are getting assays from $6 to $18 a ton. The Westminster Company is negotiating with English capital for taking up the $85,000 bond on this property, due in July next.

ARIZONA.

D. B. Gillett, superintendent and general manager of the Gold Note and Surprise mines, has since commencing work on the mines, about June 1st of last year, up to February 8th done 2790 feet of work in sinking and drifting on the claims, all of the work being blasting ground. Included in the work on the Gold Note is a double compartment shaft which has been sunk to the 200-foot level and is well timbered and lined. Work will be resumed on the shaft the first of March and it will be continued to a depth of 500 feet, from which point levels will be run.

Nogales *Oasis*: For each hundred feet of the new four compartment shaft now going down on the Grand Central mine about 35,000 feet of timbering is required.

Development work was recently commenced on the South Verde mine, about 400 yards beyond the Verde.

The "Daniel Best" Crude Oil Engine.

Showing Improved Gas Generator for Using Crude Petroleum for Fuel.

In these days of fierce competition it is necessary, for all who hope to succeed, to reduce running expenses to the lowest possible point; hence by the use of a recently patented gas generator, to be used in connection with a gas engine, it is possible to use the cheapest grades of gas oils, such as crude oil, distillate, common coal oil or kerosene, gasoline or naphtha. It will furnish power at one-quarter the cost of steam power and at one-half the cost of power furnished by the ordinary gasoline engine, so that the "Daniel Best" crude oil engine will save any user of power a large per cent of his operating expenses, and will pay for itself in a very short time.

The reasons why the "Daniel Best" crude oil engine is superior to the ordinary gasoline engine are as follows:

First—It can use crude oil instead of gasoline alone, and is absolutely safe from explosions or danger of causing fire. Plunge a burning brand into a can of crude oil and it will be extinguished as surely as if plunged into water, but if you bring the burning brand anywhere near a can of gasoline there will be an explosion and a fire.

Second—One gallon of crude oil will furnish as much power with the "Daniel Best" engine as a gallon of gasoline will with any other engine made, and the cost of crude oil is about one-fourth that of gasoline. There is a refined lubricating oil left, when using a paraffine base, which is worth nearly as much as the first cost of the crude oil, so that the saving in fuel in operating the "Daniel Best" engine is by far the most economical power yet discovered.

Third—With gasoline there is a constant loss by evaporation, which is of course much greater in warm than in cold weather, and in hot weather this loss is very large, sometimes reaching as high as 50 per cent, while with crude oil (petroleum) there is scarcely any loss from this source.

Fourth—Crude oil acts as a lubricant as well as furnishing gas for power, and keeps the piston of the engine always lubricated, thus they do not wear as do the pistons of the ordinary gas engines using only gasoline or manufactured city gas; hence the "Daniel Best" crude oil engine is the more durable.

Fifth—While the "Daniel Best" engine will run with crude oil, it will also run with either city gas, gasoline, naphtha, common coal gas, or distillate, so that in case of one kind of fuel giving out any of the others can be used; and the "Daniel Best" engine, by the use of this newly improved generator, will get more power from a given amount of oil that will any other gas engine in the market.

From a test we made, the following table will show the comparative cost of operating a 5-horse power steam engine and a 5-horse power "Daniel Best" crude oil engine using gasoline, common coal oil, distillate and crude oil from Coalinga, Fresno county, oil wells, also crude oil imported from Peru, and based upon actual service of the above-named engines, running ten hours on each kind of fuel named.

The first test of the "Daniel Best" engine was on gasoline 74 gravity; second, cheap coal oil 110 fire test; third, distillate 40 gravity; fourth, Coalinga, Fresno county, crude oil right from the wells; fifth, Peruvian crude oil with paraffine base.

Cost of running 5-horse power steam engine ten hours:

Coal at $6.50 per ton	$1.13
Engineer	2.25
Lubricating oil	.15
Boiler compound	.05
Kindling for starting fire	.10
Total	$3.68

The "Daniel Best" crude oil engine using 74 gravity gasoline:

8¾ gallons gasoline 74 gravity at 18c.	$1.57½
Labor 1 hour attending engine and filling tank	.20
Lubricating oil	.15
Electric battery loss per day	.02
Total	$1.94½

The "Daniel Best" engine using kerosene oil 110 fire test:

7⅔ gallons kerosene oil 110 fire test at 15c.	$1.12½
Labor 1 hour attending engine and filling tank	.20
Lubricating oil	.15
Electric battery loss per day	.02
Total	$1.49½

The "Daniel Best" crude oil engine using distillate:

7⅓ gallons distillate 40 gravity at 8c.	$ .60
Labor 1 hour per day attending engine.	.20
Lubricating oil	.15
Electric battery loss per day	.02
Total	$ .97

The "Daniel Best" engine using Coalinga, Fresno county, California, crude oil right from the well:

7½ gallons crude oil 36 gravity at 5c.	$ .37½
Labor 1 hour per day attending engine.	.20
Lubricating oil	.15
Electric battery loss per day	.02
Total	$ .74½

The "Daniel Best" engine using Peruvian crude oil:

13 gallons crude oil (Peruvian) at 5c.	$ .65
Labor 1 hour per day attending engine.	.20
Lubricating oil	.15
Electric battery loss per day	.02
Total	$1.02

The generator also acts as a refinery, and from the 13 gallons of the Peruvian crude oil used we have left a residue of 3 gallons of good lubricating oil, so from this total subtract the value of this residue or machine oil:

Total cost as above	$1.02
Less 3 gallons machine oil or residue at 15c.	.45
Total cost of running ten hours on Peruvian crude oil	$ .57

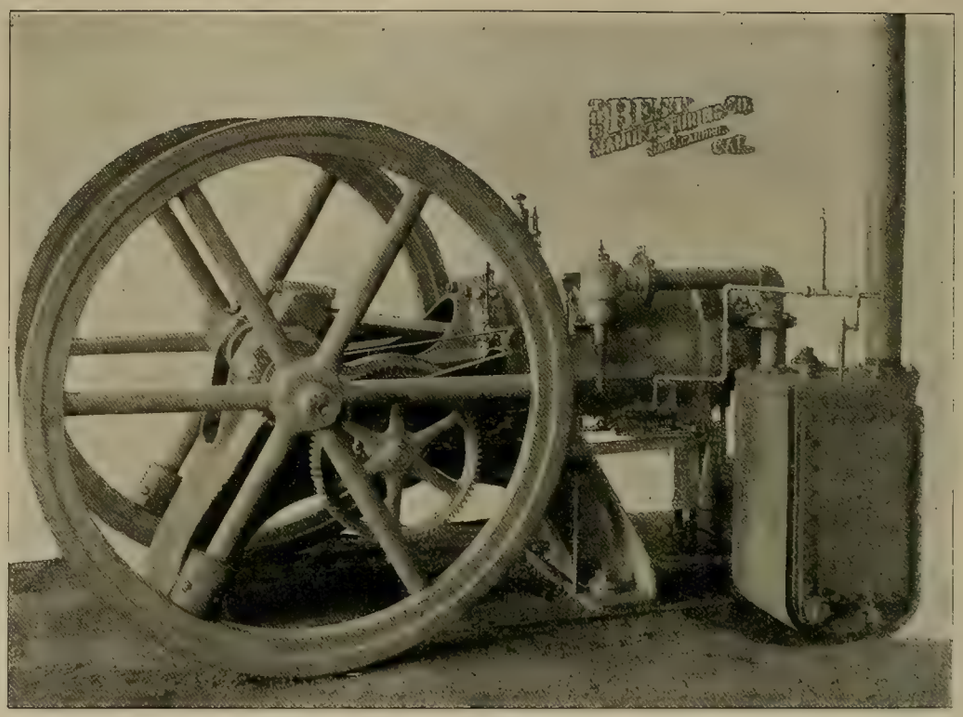
The following summary will then show cost of running a 5-horse power engine ten hours:

Steam power	$3.68
"Daniel Best" engine on gasoline	1.94½
"Daniel Best" engine on kerosene (common coal oil)	1.49½
"Daniel Best" engine on distillate 40 gravity	.97
"Daniel Best" engine on crude oil (Coalinga)	.74½
"Daniel Best" engine on crude oil (Peruvian)	.57

From these results it is easily seen what it is possible to do with our improved gas generator. By its use we get even much better results when using gasoline of 74 and 86 gravity, such as used in the ordinary gasoline engine, and much better results from lower grades of gasoline, as well as common domestic coal oil, distillate or crude oil, than is possible to get from city gas, as all gas engines run with city gas if they will run at all.

With this generator we vaporize the gasoline drop by drop, and when taken from a 50 to 100-gallon tank the last drop is as rich in gas as the first.

Every one knows of the economy of using the exhaust heat to heat the water of a steam engine boiler before it is pumped into the boiler, i. e., changing of a liquid (gasoline) to a gas produces freezing cold gas, which, when drawn into the cylinder, consumes part of its own force in heating the balance to a point of chemical change. We save the heat (which is power) of the exhaust to vaporize these lower grades of oil; there is more gas in a gallon of low-grade gasoline, distillate or crude petroleum than there is in a gallon of high-grade gasoline 86 gravity, and it is only a question of a practicable way of utilizing the waste heat to make gas of these cheap grades of oil. We have solved this problem by the use of our improved generator, and other advantages are that the danger of fire is very materially reduced; in fact, to the same bases as when using city gas, for when using gasoline, kerosene or distillate we connect with a 50 to 100-gallon tank, as the case may be, 30 to 100 feet from the engine, and it is pumped into the generator with an automatic pump only as required to produce gas enough for the engine. There is no danger of explosions of crude oil; the tank containing same can be placed where most convenient, and the oil pumped automatically to the generator when required in the same way. THE BEST M'F'G CO. *



THE "DANIEL BEST" CRUDE OIL ENGINE.

Do You Know THAT THE . . . .

MINING AND SCIENTIFIC PRESS.

HAS THE LARGEST CIRCULATION OF ANY PAPER OF THE KIND IN THE COUNTRY? : : :

. . THAT IT IS THE ONLY PAPER OF ITS CLASS . .

THAT GIVES THE EXACT FIGURES OF ITS CIRCULATION?

It Is Weekly Read by More Than 20,000 Men in Every Department of Mining and Mechanical Industry.

IF you want your business advertisement seen by the *MEN TO WHOM YOU NATURALLY LOOK FOR BUSINESS* put it in the

MINING AND SCIENTIFIC PRESS.

ESTABLISHED MAY, 1860.

A paper that has led in its line for nearly thirty-seven years must have the qualifications that entitle it to the patronage of intelligent men who realize that, while advertising pays, money is thrown away that is given for advertising in papers with no circulation and which give no results.

It is not what advertising costs, but what it produces, that determines its value.

The MINING AND SCIENTIFIC PRESS produces satisfactory results to those who use it. : : : : : : : : : : :

Economy is the judicious expenditure of money. It is sometimes economy to save ten cents; it is sometimes economy to spend a thousand dollars. Economy in advertising means to put your advertisement where it will do you good.

Our patrons find an investment in our columns a profitable one.

J. F. Halloran

Wanted: Good Engine Lathe.

14 to 16-Inch Swing. State condition, maker's name, and price. Address "LATHE," Mining and Scientific Press, San Francisco.

To Drill for Coal.

Estimates wanted for boring for coal. Only competent and expert man wanted. Call at Room 205, Crocker Building, for particulars.

British Columbia.

W. J. R. COWELL, B.A., F.G.S., Mining Engineer,

Reports on mines, designs and superintends the erection of mining and milling machinery; makes analyses of ores, metals, soils, etc.; arranges for mill tests, and selects suitable processes for the treatment of ores. Correspondence invited. Address W. J. R. COWELL, Victoria, B. C.

British Columbia.

E. S. TOPPING, TRAIL, B. C.,

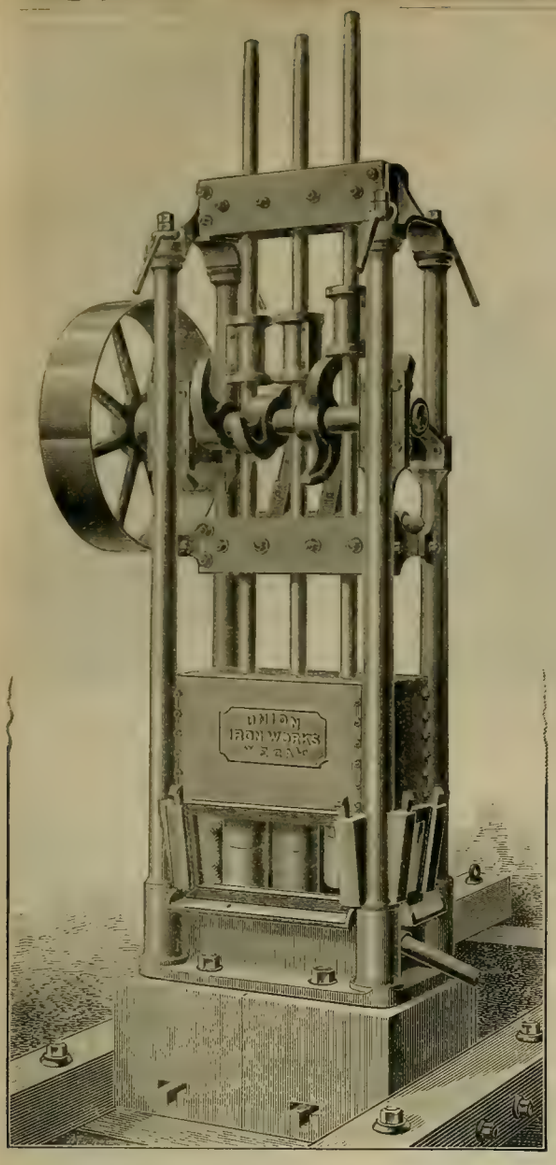
Has prospects for sale in Trail Creek and the whole of the Columbia basin. Will buy legitimate stock and mines for investors. Will examine mines. Has lots for sale in Trail and Deer Park

TUBBS CORDAGE CO.

(A CORPORATION.)

Constantly on hand a full assortment of Manila Rope, Sisal Rope, Duplex Rope, Tarred Manila Rope, Hay Rope, Whale Line, etc., etc. ☞ Extra sizes and lengths made to order on short notice

611 and 613 FRONT ST., San Francisco, Cal.



Union Iron Works,

222 MARKET STREET,

SAN FRANCISCO, CAL.

This

Three-Stamp Iron Frame Battery

WAS MADE BY THE

UNION IRON WORKS

FOR THE

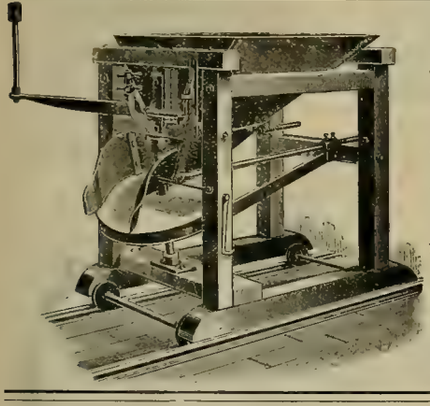
NEVADA METALLURGICAL WORKS.

The stamps weigh 350 lbs.

The total weight of the battery is 5000 lbs.

The weight of the heaviest piece is 1300 lbs.

Capacity, five tons per day.



Millmen! Investigate This.

POSITIVE FEED. MINIMUM POWER.

Bolthoff Improved Challenge Automatic Ore Feeder.

The only revolving disc feeder, made without gears or clutches. Feeds wet or dry ore; slow or fast. Is operated by a Friction Band. We have other valuable stamp mill improvements.

WHEN WRITING FOR CIRCULARS AND PRICES MENTION THIS PAPER.

Hendrie & Bolthoff M'f'g Co., DENVER, COLORADO.

IF YOU HAVE A SMELTER--YOU WANT IT.
IF YOU HAVE A COPPER MINE--YOU NEED IT.
IF YOU HAVE A CYANIDE PLANT--YOU OUGHT TO HAVE IT.
IF YOU OWN CHLORINATION WORKS--YOU SHOULD BUY IT.
IF YOU ARE INTERESTED IN A MINE OR MILL--YOU CAN'T DO WITHOUT IT.

What? P. & B. Paint.

IT IS ABSOLUTELY ACID PROOF---TRIED AND PROVEN.

Manufactured by

PARAFFINE PAINT CO., San Francisco. Los Angeles.

You Can Order It From Your Dealer.

DEWEY & CO.

AMERICAN AND FOREIGN PATENT SOLICITORS

ESTABLISHED 1860.

BRANCHES AT Washington, London, Paris, Berlin, Vienna, Melbourne, Etc.

No 220 Market St.

TAKE ELEVATOR No 12 FRONT ST.

SAN FRANCISCO, CAL.

WEBER Gasoline Engine For use in any place or for any purpose requiring power. Only a few minutes' attention required each day. Guaranteed cost of operation is 1 cent per horse power per hour. The simplest, most economical and best power. Address WEBER GAS LINE ENGINE CO., 430 Southwest Boulevard, Kansas City, Mo.





HOME MANUFACTURE.

FOWLER'S

Fossil and Asbestos Sectional Covering.

As a Non-Conductor, Unequaled.

Special Rates for Steam Boilers and Drums

C. G. Fowler, 656-58 Howard St., S.F.

Coast Industrial Notes.

—Santa Cruz, Cal., is raising $10,000 to establish a woolen factory.

—The California Woolen Mills, Petaluma, Cal., have resumed operations.

—This year's orange crop at Redlands will bring California $400,000. The fruit sells for $2.50 per box.

—The Navy Department has ordered the first payment of $80,000 to the Union Iron Works upon the battleship Wisconsin.

—Railroad engineers have incorporated the Tia Juana Fruit Company, to do business at the Needles, Cal., with a capital of $60,000.

—The California State Mining Bureau proposes to make a thorough geological survey of the region lying within a radius of ten or fifteen miles of the town of San Luis Obispo.

—A news bulletin can now be flashed from New York to San Francisco in ten seconds, heavy copper wire which spans the continent without relay stations making this rapid transmission possible.

—The Manufacturers and Producers' Association will hold a stockholders' meeting, Room 2, 6th floor, Mills Bldg., S. F., at 1:30 P. M., next Wednesday, the 24th inst., to elect officers for the ensuing year.

—The O. R. & N. people contemplate the construction of a line from Umatilla Junction or Wallula, up through the Okanogan country and into the mining districts of the Kootenay country.

—Two or more trains run regularly over the U. V. & P., Arizona, on account of the machinery and building material daily arriving at the junction. Bullion at the Jerome smelter is increasing, and shipments are now made almost entirely at night.

—Sixteen hundred carloads of beans are stored in warehouses in Santa Barbara and Ventura counties. About half are Limas and the rest other varieties. When the beans are stored in Southern Pacific warehouses the company advances $1 per cental.

—A dividend (No. 23) of 25 cents per share has been declared on the capital stock of the Paraffine Paint Co., 116 Battery street, San Francisco, payable at the office of R. S. Shainwald, secretary, on March 29. This company furnishes a good article and is deservedly prosperous.

—The Santa Fe Railway Company is changing its oil-burning engines in California back to coal burners. The company has been using from 600 to 800 barrels of oil per day, but the rise in price, with the still further advance, as a result of the oil combiniation, has resulted in going back to the former conditions.

—The mill of the Corralitos Paper Mill Company, recently built at Watsonville, Cal., has been shut down. The people residing along the stream on which the mill is located complained of refuse from the mill running into the water, and, as there was no other place for it, the only alternative was to close the mill.

—Three hundred tons of steel rails have been sent to Salinas, Cal., to be used in building a mile of railroad switches for the new beet sugar factory. There will be over 500 acres of land occupied by the factory and its necessary beet sheds, pulp sheds, pumping plants, reservoir, machine shops, offices, warehouses, switches, etc.

—It is estimated at the Chino, Cal., sugar factory that 144,000 tons of beets will be delivered there next summer and fall. From these will be made 40,000,000 pounds of sugar. The output in '96, with a short crop of 65,000 tons of beets, was 17,000,000 pounds of sugar, which, at a net profit of 1¼ cents a pound, netted the factory owners $250,000 for the season.

—About 20,000 acres of land west of San Bernardino, Cal., have been bought by the Anglo-American Canaigre Company and the Chicola Water Campany. It is stated with apparent authority, that when the investment is completed, it will represent an outlay of $1,500,000. The company will put in a crop of canaigre, 2000 acres to be planted this year. A canaigre factory will be built a year later.

—San Francisco has in operation one of the most thorough systems of food inspection in the country. It consists of four inspection stations, covering the whole of the city. It is the intention of the Board of Health to wage war on everything found adulterated. The chemical laboratory planned by the board is completed, and the various deputy inspectors are collecting samples of different kinds of food throughout the city. All adulterated brands will be condemned and confiscated.

—By a new contract between Sebastian Camacho, acting in behalf of the Western Railway Company of Mexico, and the Department of Communications, represented by General Francisco Z. Mena, the company in question agrees to keep in commission two steamships of 400 tons each, to make regular trips between the ports of Guaymas and San Benito on the Pacific, touching both ways at La Paz, Altata, Mazatlan, San Blas, Manzanillo, Acapulco, Puerto Angel, Salina Cruz and Tonala.

—The general officers of the Oregon Short Line are as follows: W. H. Bancroft, vice-president and general manager; S. W. Eccles, general freight and traffic manager; E. E. Calvin, general superintendent; D. E. Burley, general passenger and ticket agent; J. C. O'Melveny, engineer mountain division Union Pacific, chief engineer; J. F. Dunn, master mechanic Union Pacific at Pocatello, Idaho, superintendent of motive power; Ira O. Rhodes, assistant to purchasing agent Union Pacific, general purchasing agent; E. J. Fisher, claim agent mountain division Union Pacific, general claim agent; W. D. Lincoln, car accountant; J. B. Evans, general tax agent; J. M. Bennett, assistant superintendent bridges and buildings Union Pacific at Pocatello, superintendent of bridges and buildings; H. C. Smartwood, general baggage agent. The offices have been opened in Salt Lake City.

Personal.

CORBETT should now be appointed American consul to Nevada.

E. K. STEVENOT has returned to San Francisco from Sonoma county.

JULIAN SONNTAG has resigned the secretaryship of the Cal. State Miners' Association.

D. A. BENDER has been appointed assistant general manager Alameda & San Joaquin Railroad.

THOMAS ORMAN has been appointed superintendent of the De Lamar mine and mill at Pioche, Nevada.

T. M. O'BRIEN, who has been in the Yukon country since 1887, has arrived in San Francisco and will return to Circle City, where he has large interests, in June.

M. A. KNAPP has gone as engineer to the Rosario mines, 60 miles back of Mazatlan, old properties which have long been worked and which now employ about 900 men.

RALPH NICHOLS last week resigned the superintendency of the De Lamar mines at Pioche, Nevada, and left for Leadville to take charge of the Moffit and Smith properties.

COMMISSIONER OF THE GEN. LAND OFFICE, LAMOUREUX, who used his high official position to beat the mineral land bill, and who did his best or worst against that needed public measure, has been caught in other equally questionable work and will be dismissed from the department.

Commercial Paragraphs.

WITHIN two years past between 3000 and 4000 Anaconda axles have been put in use in Montana and other western States and British Columbia. Users find them cheap, simple and easy to care for, and "repeat" orders are numerous. A catalogue describing this axle is published by Fraser & Chalmers, Chicago.

THE large Rand compressor, recently installed in the LeRoi, B. C., mine, will be known as the "Senator," and is to be used for running all the pumps and hoists at the mine, in addition to operating forty drills. It is described as a beautiful piece of mechanism in every detail of its construction, and is fitted with the latest type of mechanical air valves, automatic governors, etc. It has the distinction, furthermore, of being one of the three largest compressors in use in the Northwest. The machine is a Rand air compressor of the latest improved type, with Corliss compound condensing engine; size of steam cylinders, 22x40x48 inches stroke; air cylinders, 22x34x48 inches stroke, with intercooler. The Rand Drill Company, 100 Broadway, New York, builders, report a steadily increasing demand for their compressors and drills for mining purposes, and claim that they make the most efficient, economical and durable machines for this class of work on the market.

THE success of the operation of long-distance electrical transmission is perhaps best gauged by the opinion expressed by the company operating the plant. An extract from a recent letter regarding the operation of the Fresno, Cal., long-distance transmission may be interesting to our readers. It was written by Mr. John J. Seymour, president of the San Joaquin Electric Company, operating the San Joaquin river and Fresno transmission, to the General Electric Company, which installed it: "It affords me great pleasure to write you regarding the successful operation of the long-distance transmission plant installed for our company. The entire plant as furnished has been in actual practical operation for a period of several months. The thirty-five miles transmission has given us no trouble whatever. Our load at present consists of 145 arc lights and 5000 incandescent lights and 410 H. P. in motors, the latter including 180 H. P. for the Sperry flour mill and 75 H. P. for the city pumping plant. All of the machinery doing this work has worked with perfect success from the start. The incandescent lights have most of them been newly wired in, thus enabling us to properly balance the load, and the regulation has given us no trouble whatever. During extensive tests it was impossible to find more than two volts variation between any lamps on the system. Lights so furnished seem to me to be better than incandescent lights usually furnished in San Francisco and other cities of the State."

Recent California Mining Incorporations.

Reliance G. M. Co., San Francisco; capital stock, $500,000—all subscribed; W. T. Harley, J. H. Sayre, W. J. Gwynn, L. Bowles, I. T. Milliken, W. Sharwood, W. F. Drake.

St. Elmo Mining and Water Co., Los Angeles; capital stock $2,500,000—$759,500 subscribed. W. Ferguson, J. F. and M. M. Turner, E. H. Gould, C. T. Thomas, M. J. Blaisdell, C. L. North, Los Angeles; D. M. Pyle, Bakersfield.

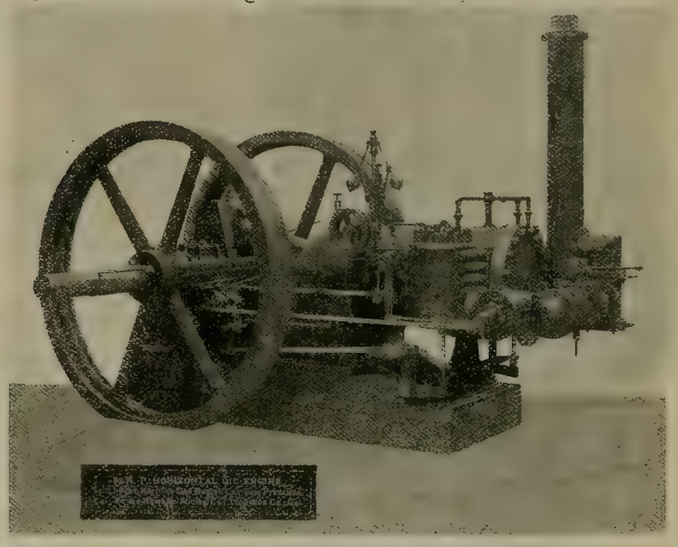
Cripple Creek—Its History to Date, Illustrated.

Just out, with correct map and costly full page views natural as life. This great book will be sent free prepaid with our big 56-col. family paper 3 months on trial for 25c (stamps or silver); club of 5, $1. Latest mining news. Mention The Press and address *Illustrated Weekly Sentinel*, Denver, Colo.

E. E. BURLINGAME'S ASSAY OFFICE AND Chemical Laboratory. Established in Colorado, 1866. Samples by mail or express will receive prompt and careful attention. Gold and silver bullion refined, melted and assayed or purchased. Address 1736 and 1738 Lawrence Street, Denver, Colo.

Hercules Gas Engine.

Herewith is illustrated an 80 H. P. Hercules self-starting gasoline engine shipped to the Rawhide mine near Jamestown, Tuolumne county, Cal., where it will be used to drive the company's new 10-inch Cornish pump. The engine is of the horizontal, single cylinder type, very heavy and substantial, of simple design and built to withstand severe and continual service. The generator will vaporize either gasoline or low-grade distillate oil, the latter being an exceedingly efficient fuel and very cheap. The governor, instead of being the usual fly wheel or shaft type, is a fly ball or pendulum governor, and controls the speed of the engine very closely by operating a valve in inlet pipe. The electric igniting device is very substantial and easily cared for. The electrodes are heavy pieces of hard steel, located in combustion chamber, the electrode stems passing through inlet valve head to permit tension springs being external and away from heat. This obviates the necessity of removing head to renew or adjust electrode springs. The tension springs can be adjusted while engine is running. A self-starting device does away with either a small starting engine or the labor of turning engine over by hand. The point of ignition is adjustable, permitting the highest possible efficiency at minimum consumption of fuel. Every precaution was taken by the builders, the Hercules Gas Engine Works, to guard against mishaps, and under exceedingly sure tests the engine made a splendid showing of economy, efficiency and general excellence.



80 H. P. SELF-STARTING GASOLINE ENGINE, WEIGHT 16,500 LBS., BUILT BY THE HERCULES GAS ENGINE WORKS, SAN FRANCISCO.

Recently Declared Mining Dividends.

South Swansea, Utah, $7500, payable March 20.

Centennial-Eureka, Utah, $30,000, payable March 15. The total to date is $1,920,000.

Bullion-Beck, Utah, $50,000, payable March 20.

Mercur, Utah, $25,000, payable March 17.

Cariboo & Rambler Consolidated Gold Mining Co., British Columbia; $20,000, payable April 15.

Portland Mining Co., Colorado; $30,000, payable March 21.

Ætna Con. Quicksilver Co., Cal., 10 cents per share, $10,000, to-day.



AINSWORTH NO. 1.

SENSIBILITY.....1-200 MILLIGRAMME.

This is a short beam balance and especially adapted for smelters and assay offices where extreme accuracy and rapidity are prerequisites.

Photos and Prices on Application.

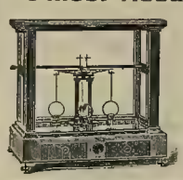
WM. AINSWORTH,

No. 2151 Lawrence Street, DENVER, COLORADO.

SMITH & THOMPSON,

MANUFACTURERS OF

Finest Assay Balances.



Our Beams are the lightest on the market, and positively inflexible. They are unequaled in accuracy and sensitiveness. Edges and bearings are of **Sapphire.** All makes of balances thoroughly repaired at reasonable rates.

2219 Stout Street, DENVER, COLO.

DEWEY & CO. SCIENTIFIC PRESS PATENT AGENCY PATENTS 220 MARKET ST. S.F.

ORES! ORES!

Gold, Silver and Lead Ores and Concentrates

PURCHASED AT REDUCED RATES FOR TREATMENT.

SELBY SMELTING & LEAD CO.

416 Montgomery St., San Francisco.

Consign shipments to Vallejo Junction, Cal.



Western Branch, Denver, Colo.

THE JEFFREY MFG. CO., Columbus, Ohio.

Send for Catalogue. 163 Washington St., New York.

FOR SALE.

The four Boilers now in use at the Crown Mills, together with Fronts, Valves, Grate-Bars, etc., are offered for Sale.

Delivery can be made on or about the 1st of May. For further particulars, inquire of

STOCKTON MILLING CO.,

STOCKTON.....CALIFORNIA.

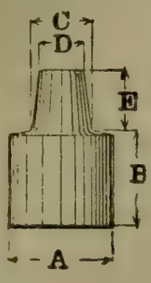
For Sale at a Bargain.

One new GOLD KING AMALGAMATOR—never used. Apply to Marshutz & Cantrell, N. W. corner Main and Howard streets, San Francisco, California.

RISDON IRON WORKS,

Office and Works: Cor. Beale and Howard Streets, San Francisco, Cal.

MINERS, ATTENTION!



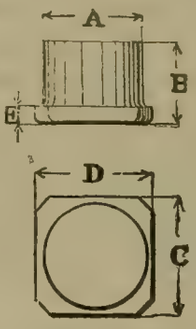
A=.....inches.
B=..... "
C=..... "
D=..... "
E=..... "

We beg to call attention to our "RISDON HAMMERED" Shoes and Dies, which are made of a special quality of steel, are hammered and then compressed in moulds so as to give the greatest possible density.

These Shoes will outlast any other make and will not chip or cup.

We have attached a sketch showing sizes; fill in the size of your Shoes and Dies, and order a trial set.

Our prices are as low as any, and the article we offer should commend it to all mine owners and mill men.



A=.....inches.
B=..... "
C=..... "
D=..... "
E=..... "

When Writing please mention the MINING AND SCIENTIFIC PRESS.

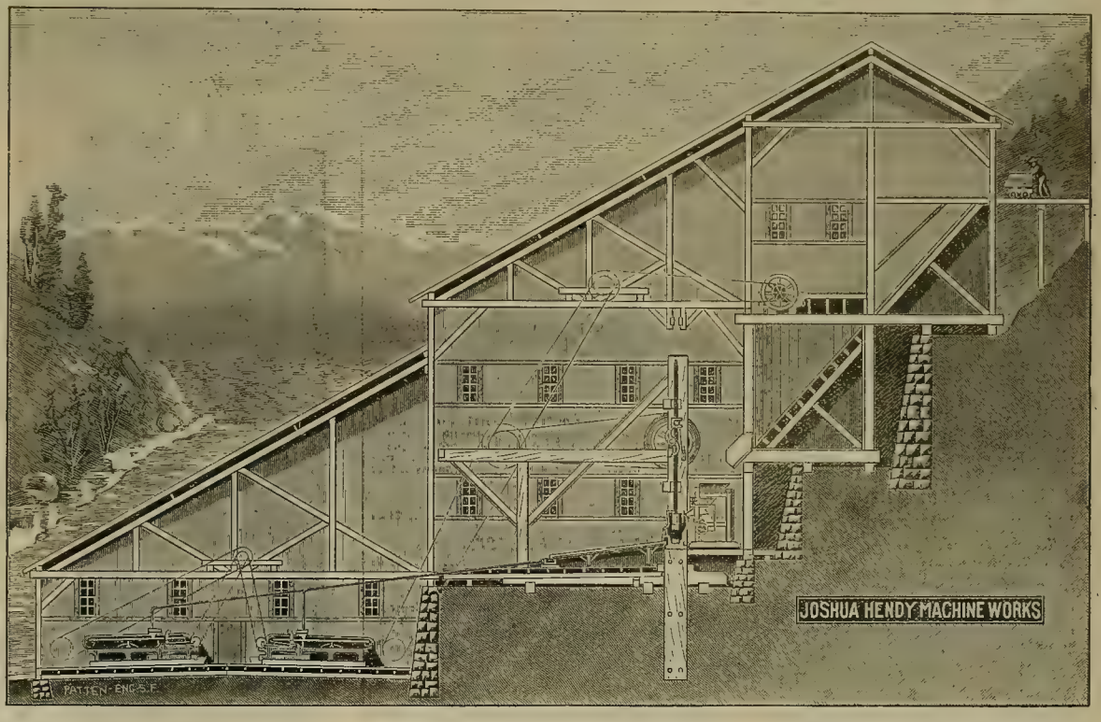
Joshua Hendy Machine Works,

SAN FRANCISCO, CAL.

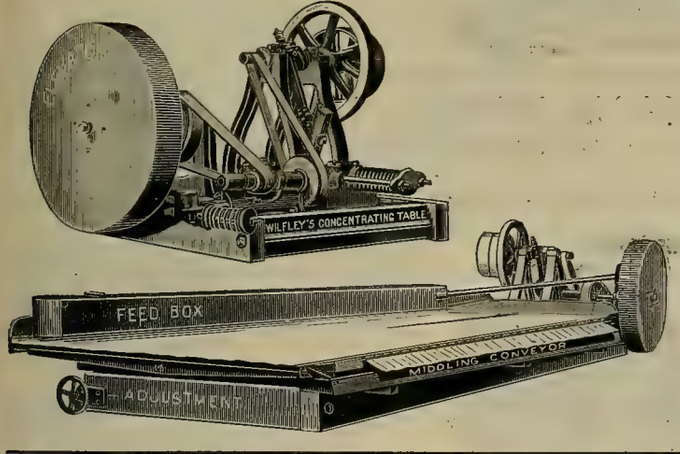
Office and Salesroom...38 to 44 Fremont Street.
Works. Cor. Kearny, Francisco and Bay Streets.

MINING and MILLING MACHINERY.

Stamp Mills,
Hoisting and Pumping Machinery,
Hendy-Norbom Concentrators,
Hydraulic Mining Machinery,
Steam Engines and Boilers,
Triumph Concentrators,
Challenge Ore Feeders,
Rock Breakers,
Water Wheels.



60-STAMP GOLD MILL.



The Mine and Smelter Supply Co.,

. . . DENVER, COLORADO, . . .

ARE SOLE AGENTS FOR THE

Wilfley Concentrating Table,

And claim for it BETTER work than any Concentrator made, with a capacity of from 15 to 25 tons per day of 24 hours. It is simplicity itself. No moving belts or intricate parts. Anyone can learn to operate in an hour.

For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Col.; M. E. Smith Concentrator, Golden, Col.; Mary Murphy Mine, St. Elmo, Col.; W. E. Renshaw, Mayflower Mill, Idaho Springs, Col.; W. H. Bellows, Boyd Mill, Boulder, Col.; H. E. Woods, Denver, Col.

ROMLEY, COLO., Jan. 19, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Answering yours of the 5th inst., would state that after a thorough trial we have discarded seven Woodbury Tables and two Johnsons and adopted the Wilfley Concentrating Table, which we think up to date is the best table in the market, so far as our knowledge is concerned. Yours very truly, [SIGNED] B. B. MORLEY, M'g'r Golf M. & M. Co.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

PRICE, $450.00.

THE GUTTA PERCHA AND RUBBER M'F'G CO.

30 and 32 FREMONT ST., SAN FRANCISCO.

Spadone's Concentrator Belts. Patented.

The "SPADONE" Curved Edge Concentrator Belt is attracting much attention among mining men, its merits appealing to the millman of practical experience.

Illustration (Fig. 1.) shows a cross-section, and (Fig. 2.) shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

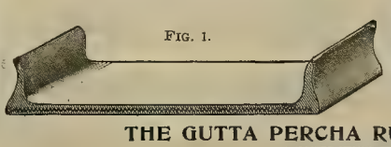


FIG. 1.

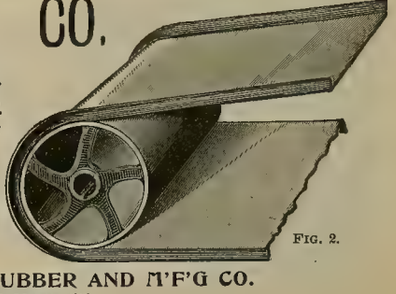


FIG. 2.

We shall be pleased to quote you also on Water, Air Drill, Steam, Suction and Fire HOSE, RUBBER BELTING and RUBBER PACKING. Correspondence Solicited.

THE GUTTA PERCHA RUBBER AND M'F'G CO.
TELEPHONE, MAIN 1813.

THE BEST BOOKS

Are always the **CHEAPEST.** All the latest and best works on **Mining, Metallurgical, Electrical and kindred subjects** can always be obtained through the office of the MINING AND SCIENTIFIC PRESS. Below will be found a list of standard books in their various lines. If you do not find what you want in it, send for catalogue and price list of **Standard Mining Works and Scientific Publications.**

MINING AND SCIENTIFIC PRESS,
220 Market Street.....San Francisco, Cal.

Assaying.—Part I—Gold and Silver Ores.
Third edition; Just Out. Rewritten and Improved by the Author, C. H. Aaron. Embraces 130 12-mo pages, with illustrations; well bound in cloth; 1896. Price, postpaid.....$1 00

Assaying.—Parts II & III—Gold and Silver Bullion, Lead, Copper, Tin, Etc.
Latest edition. Contains 161 pages with illustrations, and is strongly bound in cloth. Much of the original text is replaced by new matter. Price, postpaid.....$1 75

Notes on Assaying and Assay Schemes.
By P. De Peyster Ricketts, E. M., Ph. D., Professor in Assaying in the School of Mines, Columbia College, N. Y. Prepared with special reference to the wants of the student and practical assayer. Containing also Rules for the Examination of Mines, Assayer's Outfit, Treatment of Ores, etc. Fifteenth edition. 8vo., cloth.....$3 00

Prospector's Field Book and Guide.
By H. S. Osborn.....$1 50

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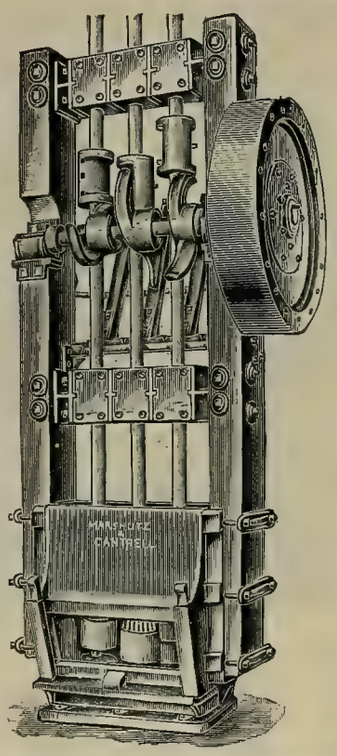
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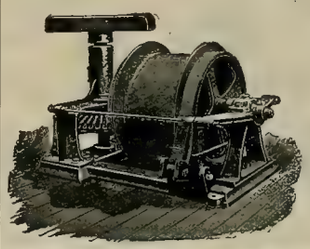
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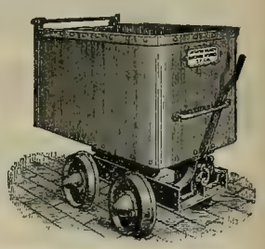
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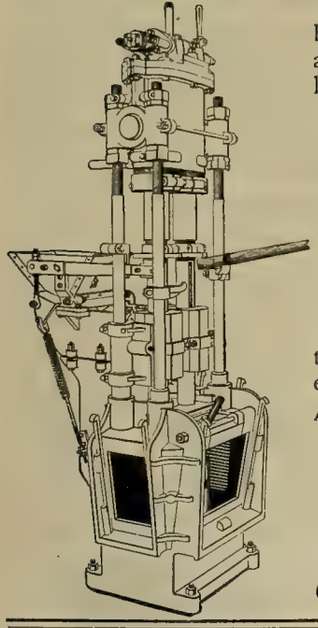
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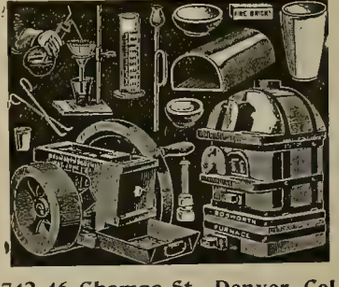
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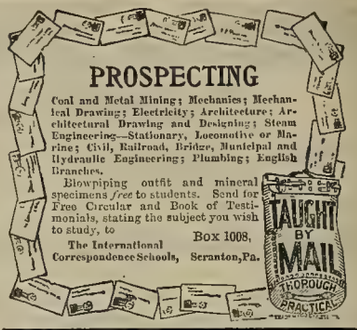
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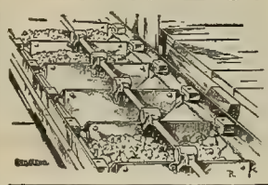
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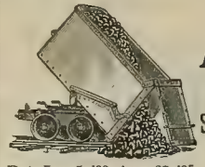
Thomas Price & Son,
Assay Office, Sampling Works
And Chemical Laboratory.
524 Sacramento Street, San Francisco, Cal.

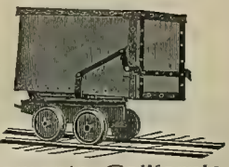
Link-Belt Machinery Co.,



ENGINEERS, FOUNDERS, MACHINISTS,
CHICAGO, U. S. A.
MODERN METHODS as applied to the handling of Freight, Grain, Ores, Raw and Manufactured Products.
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AGENTS,
Pat. Jan. 5, '92, Aug. 27, '95. *Send for Catalogue.* Sacramento, California.

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For Heavy Mining Pump Buckets. Will outwear any other material and give best satisfaction. Samples furnished on application. A. C. NICHOLS & CO., Leather Manufacturers and Dealers, 404 Battery St., S. F.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MARCH 9, 1897.

578,688 —ENGINE EXHAUST—Blubaugh & Simpson, Redlands, Cal.
578,625 —SAWING MACHINE—A. C. Calkins, Santa Barbara, Cal.
578,840.—SHIRT SHIELD—G Cann, Los Angeles, Cal.
578,628.—MIXER—A S. Cooper, Santa Barbara, Cal.
578,632.—HAIR TONIC—M. J. Fleming, Portland, Or.
578,638.—STOVEPIPE COUPLING—T. Holland, Spokane, Wash.
578,571 —WINDOW SCREEN—E Larson, Traver, Cal.
578,572 —SUNSHADE—F. E. Lashells, Sacramento, Cal.
578,701.—BICYCLE GEAR—Mette & Rayburn, San Jose, Cal
578,669 —EGG TURNER—R. A Morse, Portland, Or.
578,463 —WIRE CUTTER—J. H. Nash, Stockton, Cal.
578,581 —VEHICLE DRAFT—Jas. Porteous, Fresno, Cal.
578,471 —CANE—W. N. Sherman, Merced, Cal.
578,681 —SLIDING DOOR—C. F. Skilling, Los Angeles, Cal.
578 660.—CULTIVATOR—L. H. Smith, El Cajon, Cal.
578,612 —WAVE MOTOR—D. F. Spangler, Santa Ana, Cal.
26,727 —DESIGN—W. F. Smith, S. F.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

DRAFT CONNECTION FOR VEHICLES.—James Porteous, Fresno, Cal. No. 578,581. Dated March 9, 1897. This invention relates to the class of connections by which the draft devices such as poles and shafts are attached to vehicles. It is especially adapted for use upon vehicles having a single pivotal front wheel, such, for example, as the three-wheeled trucks used in vineyards and orchards, and its object is to provide a simple and effective device for readily interchanging the pole or shafts in connection with such trucks and at the same time furnishing a bearing on each side with which to steady the connection and guide the truck. It consists essentially of a pivotal pin for the wheel bearing having its lower extremity formed into a hook, a coupling bar or draft device having its rear extremity formed with wide parallel spaced jaw plates adapted to recive the hook between them, and to furnish a bearing for the hook and a cross pin passing through the jaw plates and engaging the hook.

SUN SHADE.—Frank E. Lashells, Sacramento, Cal. No 578,572. Dated March 9, 1897. The object of this invention is to provide a sunshade adapted to be readily and firmly secured to a person, to fit persons of different sizes and capable of having its inclination and position varied to suit conditions under which the sun may be shining on the individual. It is especially applicable to persons walking, horseback riding, in vehicles, or for bicycle riding. It consists of a vertically adjustable supporting standard having the sunshade adjustably fixed upon the upper portion, a means for carrying the standard, consisting of a waist belt to be fitted to the user and upwardly diverging back frame secured to the waist belt and to which the standard is secured, and devices passing over the shoulders and connecting the top of the back frame with the waist belt in front.

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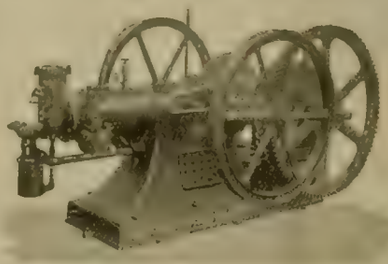
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We claim full power, automatic and positive adjustment regulating speed and consumption of fuel in proportion to work being performed. No spring electrodes to burn out. All springs are outside. Point of ignition, speed and amount of fuel can be changed while engine is in operation.



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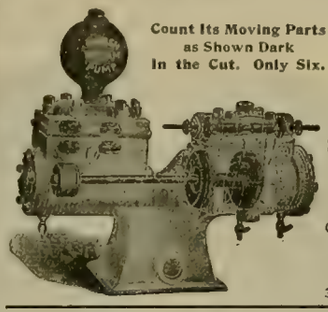
ESTABLISHED 1880. Address HERCULES GAS ENGINE WORKS,

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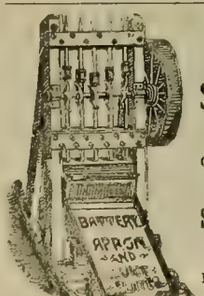
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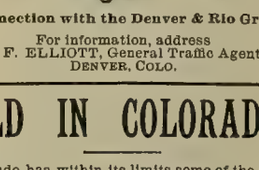
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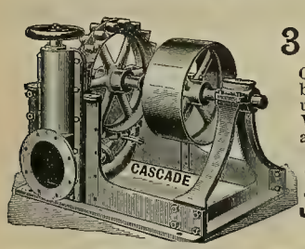
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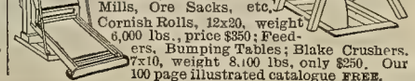
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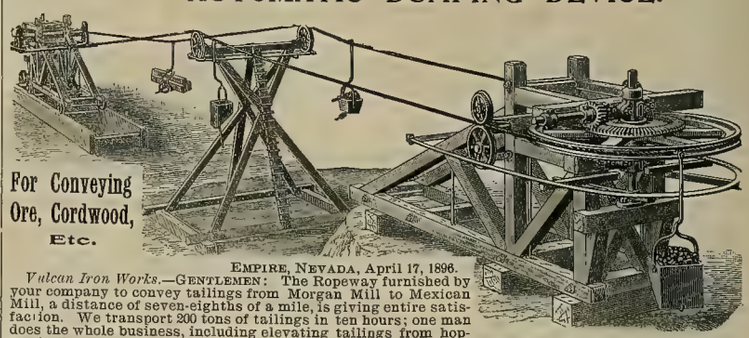
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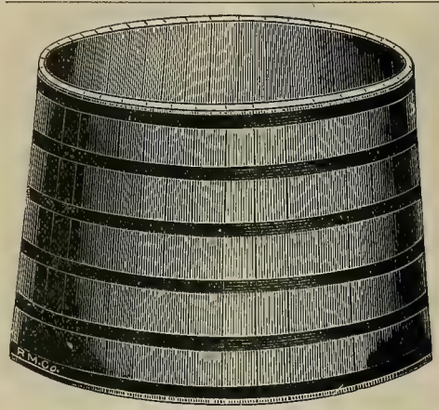
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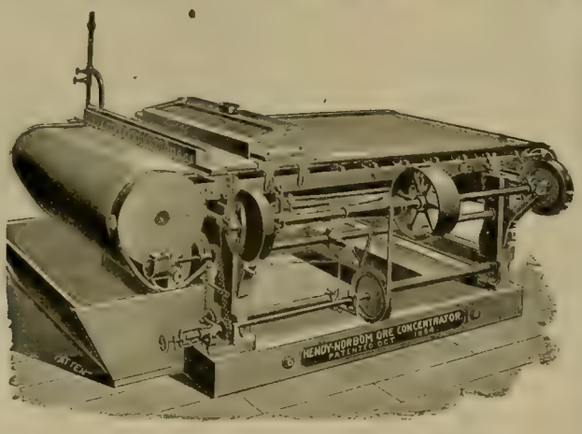
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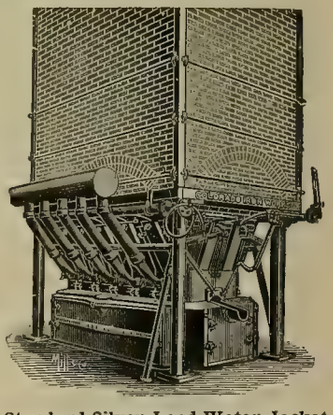
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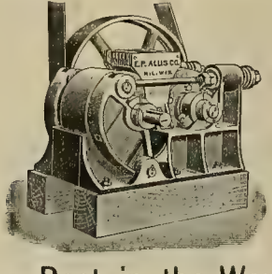
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The Markets.

SAN FRANCISCO, March 18, 1897.

The fickle character of the weather continues to interfere with an active trade call. Buying, unless for easily accessible points, is still in small quantities, owing to generally poor roads. Nearly everything that will be affected by the Dingley tariff is being marked up, with still higher values looked for when positive information comes to hand regarding how the different schedules will pass. On this coast many farm industries will be well protected, as will coal and nearly all kinds of metals. While the latter is good for the miners benefited, it works an injury on iron workers in particular, for it is calculated to give the East still greater advantage, for our iron, etc., is largely foreign, owing to the small output here, while the East has an oversupply and is increasing in export. Eastern advices continue to note growing firmness and a general feeling that the time for the better has come and business will steadily improve. The different financial trade and mining journals are largely optimists on the situation.

The local money-market is practically unchanged. Money begins to come out for investment, which will grow as the spring months pass and business improves. Exchange on New York is slightly firmer. Light shipments of produce eastward offer limited exchange. Importers of foreign goods are said to be sending money East to withdraw them from bond in anticipation of an early passing of the tariff bill. The East reports the rates of interest firming up. The stronger tone is due to more inquiry for funds and decreasing bank reserve. There have been free withdrawals of goods from bond, which necessitated payments of duty. These payments, it is said, aggregate a large sum at the end of each week.

New York Silver Prices.

NEW YORK, March 18.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	29 3-16	63⅝
Saturday	29 1-16	63⅜
Monday	28 15-16	63
Tuesday	28⅝	62
Wednesday	29 9-16	62⅛
Thursday	29 9-16	62¼

	Copper.	Lead.	Iron.	Tin.
Friday	11 85@12 00	3 40	10 25@12 50	13 40
Saturday	11 85@12 00	3 40	10 25@12 50	13 40
Monday	11 85@12 00	3 37½	10 25@12 50	13 35
Tuesday	11 85@12 00	3 37½	10 25@12 50	13 30
Wednesday	11 85@12 00	3 40	10 25@12 50	13 25
Thursday	11 85@12 00	3 40	10 25@12 50	13 25

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	7½c Prem
New York Telegraphic Transfer	12½c Prem
London Bankers' 60 days	$4.86½
London Merchants	$4.85
London Sight Bankers	$4.89
Refined Silver, per oz., 1000 fine	62¼
Mexican Dollars	49½@50

SILVER.—The market continued to go up until Wednesday, when an improvement came through from New York, with still better prices to-day. This advance stopped the decline in London. The pending adverse legislation by Japan has its influence on the market. The situation at present is hard to solve satisfactorily; but there is one thing certain, unless the markets abroad receive more support than it looks as if they will receive at this writing, it is only a question of time when lower prices will rule. It may be that low market values will force leading nations to give support to the white metal. Mail advices from New York state that there is a fair outward movement.

MEXICAN DOLLARS.—In sympathy with silver, the market sold lower, but at the close there is a steadier feeling. The demand is only fair.

QUICKSILVER.—The market is firm at quotations. In our market there is more or less cleaning up by outside holders at slightly lower prices than we quote. The East and Europe report a similar condition. Large handlers look for still higher prices in the near future.

Our market is quoted at $40 for domestic consumption.

COPPER.—The East reports a continued free outward movement, with an increasing home demand. All information from abroad and from New York indicates an entire absence of any speculative movement. This would seem to point to shading in prices.

The local market is quoted as follows:

Ingot, jobbing	14½@—
Ingot, wholesale	—@13¾
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17c

LEAD.—In our market prices have been marked up, with a strong tone reported. The East and Europe report strong markets, with an improving demand.

Our market is quoted in jobbing lots as follows:

Pig	4 00	@	4 25
Bar	—	@	4 50
Sheet	5 62½	@	6 12½
Pipe	4 87½	@	5 37½

SHOT.—The threatened advance has taken place at last.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs			$1 35
Drop, B and larger sizes,	"	"	1 60
Buck, Balls and Chilled, do,	"	"	1 60

TIN.—The market is fairly active for both pig and tin. The tendency appears to be upward. This would be more pronounced if it was assured that the higher tariff bill will become law.

We quote as follows in a jobbing way:

Pig, per lb	14½c@ —
Plate, I C coke, heavy, per box	$4 05@ 4 15
" " " light, "	3 95@ —

BORAX.—Market prices and demand are practically unchanged.

The market is quoted as follows:

Refined, in car lots	4¾
Refined, in sacks	5¼
Powdered, in car lots	5
Concentrated, "	4½

POWDER.—The market is higher. The demand continues free.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

IRON.—There is continuation of both American and foreign. The market shows considerable firmness. The East reports a large consumption, with values fairly firm. The exports of southern to Europe promise to be very heavy this year.

AMERICAN.	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50
ENGLISH.		
Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL—The market is practically unchanged. There is a continued fair consumption of household, but steam seems to be falling off some. The supply of all kinds is ample.

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

ANTIMONY.—The market is firm at an advance.

Our market is quoted at 7¼@8¼c in a jobbing way. New York mail advices quote 7½c for Cookson's, 6¾@7c for Hallett's and 6⅞@7c for Japanese.

NAILS—The demand is increasing.

Wire, carloads, basis per keg	
" jobbing, " "	$2 25
Cut, carloads, " "	
" jobbing, " "	2 10

SPELTER—The market is quiet but firm. The East reports a fairly active demand.

We quote our market in a jobbing way at 5 cents a pound.

NICKEL ANODES.—The markets here and at the East are steady.

PLATINUM.—Dealers report a fair inquiry. Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC.—The market is steady at quotations. Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady. We quote in jobbing lots at 50 cents per pound for ingots.

BISMUTH.—There is a fair inquiry for the season.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is steady to firm.

We quote in a jobbing way at 70 to 75 cents per pound.

Chemicals.

Pending tariff legislation unsettles the market somewhat. The general feeling is that prices will advance on several lines.

BONEASH.—There is a good export movement, chiefly to Australasia.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is reported quiet but firm at 2¾c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is quiet but steady at $1.70 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a slow demand at 2¼c a pound from stores.

NITRATE OF SODA.—Advices from primary markets are against sellers. Our market is easy.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is quiet at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported steady from store at 6½c per pound in carboys.

SULPHURIC ACID.—The demand is light. We quote in a jobbing way at 1½c per lb for 66%.

BLUE VITRIOL.—The Eastern markets are steadier. Our market is steady, but dull.

We quote in a jobbing way at 4½c per pound.

Mining Share Market.

SAN FRANCISCO, March 18, 1897.

The market continued dull throughout the past week, with no redeeming features worthy of note. Fluctuations were downward up to Wednesday, when Chollar showed more strength, steadying the entire line. Con. Virginia sold at $1.20 the past week, which is a lower figure touched than for a long time past. Low as it is, the belief in well-informed circles prevails that considerably lower prices will be seen within the next few weeks, although a rally may take place first. This opinion is doubtless based on seemingly authentic advices, that large money men are not in the market, and not likely to come in until all lawsuits have been ended and enough ore uncovered to justify them in taking a hand in promoting a bull movement. If this is the correct situation, then outside holders will have to face more assessments and lower prices. They begin now to talk about the prospects of striking the west lode by the long west crossdrift, which is being run jointly by Con. Imperial, Challenge and Confidence. This crossdrift, it is stated, ought to strike the west lode in April. We venture the opinion that even if it does, it is safe to predict that no big reports will be made of the find. The writer has reason to believe that the work will not go beyond the first few feet of ore, which does not assay more than fair grade. It is quite possible that they may do the same as has been done in Alpha, fail to strike the west lode for fear, it is said, of its bearing on the share market. Even the Bullion west crossdrift was not extended far enough to the west to strike the lode. It is said to have been run in such a way as to make it very considerably longer than it should have been. The Con. Virginia stringer of ore, which it was thought by the bulls would turn out to be a good proposition, has not developed much size and only good grade. The failure to come up to expectation as work progressed has had an unfavorable effect on the shares of the mine. As these went down in value, Chollar's shares began to strengthen owing to favorable reports from the work on the Brunswick lode, and also to this mine seemingly being under improved management. The Standard Con. (Bodie district) has held steady prices. The outlook is said to be favorable for this mine.

Official letters from the Comstock mines continue stale and barren of news calculated to encourage outsiders who have been paying assessments for many a long, weary day. It is stated in well-informed circles that better reports based on actual work can be made, but they fear the public would rush in and buy, only to be heavy losers if promising prospects did not materialize. It must be cause for congratulation, this display of regard for outsiders, yet no one believes it, for dealing in shares is like playing at the game of love and war, all is fair between contestants. From the Alta group nothing of importance is at hand. The official letter contains the same "old song and dance," but as for that, all the other official letters are of the same character. The letters from Overman and Caledonia are practically unchanged. The work points to more time. The Seg. Belcher and Belcher letters fail to report on the reported strike made some time ago. Private advices state that when the powers that be are ready these mines can be made to pay dividends. Crown Point reports fair work on several levels, without any change worthy of note. No advices come to hand from Yellow Jacket. In Confidence snail progress is being made; faster work appears to be made in spending money than prosecuting work. Work is cantinued on the Challenge, Confidence and Con. Imperial joint cross-drift, but slow progress is being made. In Alpha it looks as if they are fooling away time so as to get rid of assessment money. By pushing farther west rich ore could be found—so it is reported at Virginia City. From Bullion the news is unimportant. They are prospecting in Potosi on the tunnel level. No work is being done in Chollar; all work is being confined to the Brunswick lode. The official letter from Hale & Norcross indicates that preparatory work for more exploiting has been completed. Best & Belcher and Gould & Curry are running a joint east cross-drift on the 800-foot Bonner shaft level. Active work is reported from Savage. Work in Consolidated Virginia is confined to the levels reported the past month or two; present prospects are not flatering for a big find; work must be farther west to strike the rich and wider lode. In Ophir work is continued on the 1000-foot and Central tunnel levels; nothing of importance is reported. The Mexican letter is of about the same character of those received for several months past. From Union, Sierra Nevada and Utah nothing of interest comes to hand. There are rumors about Andes, but they are not positive enough yet to note.

From the Brunswick lode the official letters

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.		Secretary.
Alma G M Co, Cal	1	5c	Feb 9	Mar 13	Mar 29	D Gutmann, 320 Sansome
Alpha Con M & M Co, Nev	18	5c	Mar 2	Apr 5	Apr 27	C E Elliott, 309 Montgomery
Andes S M Co, Nev	43	10c	Feb 1	Mar 8	Mar 31	Jno W Twiggs, 309 Montgomery
Belcher S M Co, Nev	54	25c	Mar 2	Apr 6	Apr 27	C L Perkins, Mills Bldg
Best & Belcher M Co, Nev	61	25c	Jan 26	Mar 2	Mar 23	M Jaffe, 309 Montgomery
Con Cal & Va M Co, Nev	8	25c	Mar 8	Apr 13	May 3	A W Havens, 309 Montgomery
Confidence G M & M Co, Co	1	10c	Jan 19	Feb 27	Mar 20	F Aureguy, 320 Sansome
Confidence S M Co, Nev	28	30c	Mar 12	Apr 16	May 7	A S Groth, 414 California
Con Imp M Co, Nev	38	1c	Feb 16	Mar 23	Apr 13	C L McCoy, Mills Bldg
Eureka Con Dritt M Co, Cal	7	5c	Jan 20	Feb 26	Mar 20	D M Kent, 330 Pine
Horseshoe Bar Con M Co, Cal	7	10c	Mar 8	Apr 17	May 8	D M Kent, 330 Pine
Jamison M Co	9	5c	Nov 27	Mar 26	May 21	Sam W Cheyney, 120 Sutter
Marguerite G M & M Co, Cal	5	10c	Jan 14	Feb 25	Apr 8	Chas Peach, 237 Twelfth
Mexican G & S M Co, Nev	56	20c	Mar 3	Apr 7	Apr 29	C E Elliott, 309 Montgomery
Mineral Hill M & S Co, Cal	1	5c	Jan 4	Feb 15	Apr 13	Chas Peach, 210 Sansome
Occidental Con M Co, Nev	26	10c	Feb 10	Mar 16	Apr 6	A K Durbrow, 309 Montgomery
Ophir S M Co, Nev	70	25c	Feb 5	Mar 10	Mar 30	E B Holmes, 309 Montgomery
Potosi M Co, Nev	47	20c	Mar 10	Apr 14	May 5	C E Elliott, 309 Montgomery
Reward G M Co, Cal	18	2c	Feb 6	Mar 11	Mar 27	S W Backus, Mills Bldg
Sierra Nevada S M Co, Nev	112	25c	Mar 2	Apr 6	Apr 26	E L Parker, 309 Montgomery
Thorpe M Co, Cal	5	5c	Jan 13	Mar 10	Mar 29	A F Frey, 44 Phelan Building
Troy M & D Co, Alaska	3	10c	Feb 2	Mar 9	Mar 26	O Ryst, 421 Mission

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D. D. WASS, Electrical Engineer, 56 First Street, San Francisco, Cal.

report more or less active work in Occidental, Chollar, Savage, Gould & Curry and Best & Belcher. The work in Chollar is favorable. As it progresses it shows that the mine, properly managed, can be put on a small paying basis, but it looks as if the bullion proceeds are to be eat up largely by dead work. The work reported is on the 200-foot and 500 foot levels and sinking the shaft. The latter is down on the incline over 825 feet. Stormy weather interferes with ore shipment, which stops stoping. In Occidental they are doing some active work, but the ore found, so far as reported, does not justify extracting.

The following illustrates the changes of the week:

MINES.	Mar. 11.	Mar. 18.
Alpha		
Alta Consolidated		
Andes		
Belcher		
Best & Belcher	$ 77	
Bullion		
Challenge		
Chollar	1 00	$ 1 05
Confidence		
Consolidated California and Virginia	1 55	
Consolidated New York		
Crown Point		
Exchequer		
Gould & Curry	35	
Hale & Norcross	80	
Justice		
Mexican		27
Opbir	97	
Overman		
Potosi	32	33
Savage		20
Sierra Nevada	20	26
Union	32	
Utah	05	
Yellow Jacket	26	20

Under date of the 12th inst. Jas. A. Pollock writes from Salt Lake City.

The mining stock market was fairly active and a decided improvement in quotations may be noted in some stocks. The tone of the market was undeniably healthy and there is a strengthening tendency in the high grade stocks that must eventually impart confidence in the general list and in time lend to a higher range of values. I regard the future in a very favorable light.

Ajax was again lower, and sold down below last week's prices. There seems to be no good reason for the depressed state of the stock, other than the fact that buying has been very limited. The properties are looking exceptionally well. Anchor and Alliance both remained without feature. The former is sending in some ore. As was stated by me would be the case, Bullion-Beck has declared its March dividend in the sum of $50,000, or 50 cents per share. The stock went off the amount of the dividend at the close, with only limited dealings. At the mines the showing of ore is reported to be very fine, but the properties are being pressed to their utmost limit, regardless of metal prices. Buckeye was a fraction stronger, with no heavy business. On the usual date the Centennial Eureka will pay the regular dividend, although shipments of ore are being very much curtailed on account of unsatisfactory treatment charges. The management announces that no mill will be erected in the immediate future.

Although the mines are looking very well, Daly was no stronger than last week, in fact, the feeling was one of depression. An immense snowslide on the 7th did considerable damage to Daly No. 1 hoisting works and caused a suspension of operations at the plant. Only limited offerings were recorded. Daly West was not very active and quotations were practically unchanged. Dalton & Lark did little business. Asking quotations were unchanged with bidding lower. Dalton was lower. Nothing is being done at the properties. Dexter reported a strike and the stock moved up several points, with little business really done.

Nothing was done in East Golden Gate. It has not been announced as yet what the future policy of the company will be. Another assessment is likely. Four Aces sold lower. Galena was about unchanged. The March dividend meeting has not yet been called. Geyser Marion was in fair demand, with prices about unchanged. The company is making regular cyanide shipments and official reports show it to be doing well. Horn Silver was not active, in fact, it never is on this market, there being so few local sellers. The mines are looking very well and the mill is doing good work. Little Pittsburg was active at advancing figures.

Mercur has declared its regular dividend, payable on the usual date. The stock sold up to and above the $7 mark and remained practically unchanged, even after the dividend books closed. The tendency is upwards. Some splendid developments have occurred at the mine during the past week. It is estimated that the ore reserves have been increased by fully a year's supply, through the new disclosures. The mill increase will require about forty days before completed. Mammoth recovered very materially and at the close was passing the $2 mark. Some high-grade gold ore is coming from the properties, which are looking well. Northern Light did not fluctuate widely. Higher prices are anticipated for the stock when the mill gets down to actual work.

Ontario was offering at lower figures than for some weeks, while buyers were not numerous. Richmond-Anaconda sold at last week's bidding prices. Rover was materially stronger, on encouraging reports from the properties, where the development work being carried on is uncovering some nice ore bodies. Sunbeam was fairly active at unchanged figures. Silver King has paid its March dividend, while Sacramento passed its payment for this month. The latter stock was offered down. Sunshine was not very active and prices remained unchanged. Mill operations will probably soon be resumed, as some large milling ore bodies have been blocked out. Swansea made good advances and sold at better figures than for some weeks. The company has resumed ore shipments. South Swansea has not yet declared its March dividend but will probably do so soon. The stock changed little. Tetro sold slightly lower. Utah has been making a splendid shipment record and the company is expected to pay its usual dividend this month. The treasury's condition certainly merits a payment.

San Francisco Stock Board Sales.

SAN FRANCISCO, March 18, 1897.

9:30 A. M. SESSION.

100 Chollar.....1 05|100 Yellow Jacket.... 29
100 Mexican..... 27|

SECOND SESSION—2:30 P. M.

250 Savage..... 29|1400 Kentuck.. 01
300 Potosi..... 33| 50 Sierra Nevada.... 26
200 Yellow Jacket.... 27|200 Standard.....1 60
500 Con Imperial..... 01|

Assessment Notices.

JAMISON MINING COMPANY.—Location of principal places of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 5th day of November 1896 an assessment (No 9.) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 26th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W CHEYNEY, Secretary.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 13th day of January, 1897, an assessment (No. 5) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of February, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 15th day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

POSTPONEMENT.

By order of the Board of Directors the date of delinquency of the above assessment is postponed to the 10th day of March, 1897, and the day of sale to MONDAY, the 29th day of March, 1897.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

ANDES SILVER MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Virginia City, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 1st day of February, 1897, an assessment (No. 43) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, Rooms 20 and 22, Nevada block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 8th day of March, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 31st day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

JOHN W. TWIGGS, Secretary.

Office—Rooms 20 and 22, Nevada block, 309 Montgomery street, San Francisco, California.

CONSOLIDATED CALIFORNIA AND VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the 8th day of March, 1897, an assessment (No. 8) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 47, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 3d day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room No. 47, Nevada block, No. 309 Montgomery street, San Francisco, California.

DELINQUENT SALE NOTICE.

MARGUERITE GOLD MINING AND MILLING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice.—There are delinquent upon the following described stock, on account of assessment (No. 5) levied on the 14th day of January, 1897, the several amounts set opposite the names of the respective shareholders, as follows:

Name.	No. Cert.	No. Shares.	Amt.
Julius Winkler	29	250	25 00
G F. Deetken	82	1.000	100 00
Julius Winkler	96	500	50 00
Mrs. G. F. Deetken	190	600	60 00
Fred Deetken	237	1.000	100 00
Mrs. G. F. Deetken	239	400	40 00

And in accordance with law, and an order from the Board of Directors, made on the 14th day of January, 1897, so many shares of each parcel of such stock as may be necessary, will be sold at public auction, at the office of the company, 237 Twelfth street, San Francisco, California, on THURSDAY, the 8th day of April, 1897, at the hour of 5:30 o'clock P. M. of said day, to pay said Delinquent Assessment thereon, together with costs of advertising and expenses of sale.

F. METTMANN, Secretary.

Office—237 Twelfth street, San Francisco, California.

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The Board of Supervisors of Butte County, California, hereby invites plans, specifications and proposals for furnishing the following named machinery, viz:

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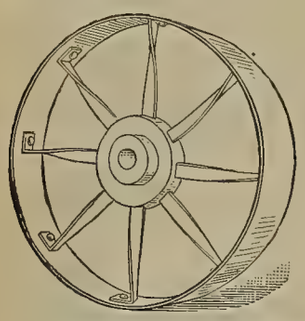
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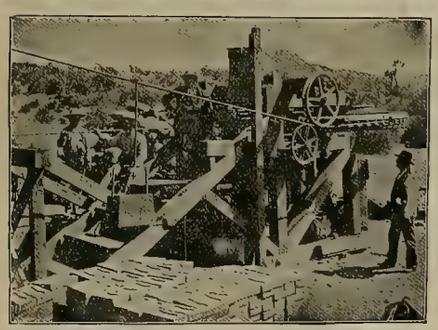
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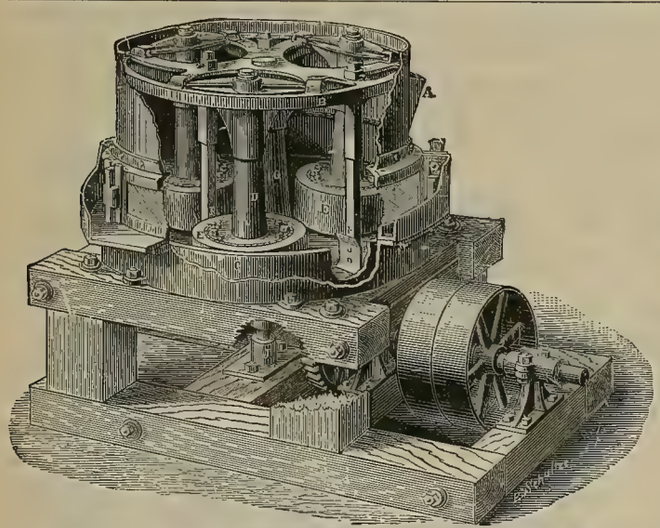
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AND PACIFIC ELECTRICAL REVIEW.

No. 1916.—VOLUME LXXIV. Number 13. SAN FRANCISCO, SATURDAY, MARCH 27, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Quicksilver.

California is the only State in the Union in which quicksilver is produced, and from this State comes nearly half the world's supply. The supply can be increased easily at any time that the markets will warrant, and with the increased demand of the past two years there has been a corresponding increase in the output.

There are not in the State, however, any such great mines as the Almaden of Spain, which produced in 1895 40,669 flasks, and in 1894, 44,521 flasks, although the furnaces were closed down for six months each year. These mines could easily produce enough to supply the demand of the whole world for many years to come. In Austria, as in Spain, most of the quicksilver produced comes from one mine, the Idria. The output has for several years past been about half as much as from all the California mines. There are in Mexico three or four producing mines, several in Italy and in Russia. Altogether these three countries produce somewhat less than California.

Lately some mines have been opened in British Columbia. Inquiries have been sent to San Francisco for men and machinery for opening mines in Peru.

In California cinnabar has been profitably worked in many parts of the State. According to the last report of the State Mineralogist, from which the illustrations on this page and on page 257 are taken, there were last year nine quicksilver mines in Colusa county, thirteen in Lake, ten in Napa, two in San Benito, eight in San Luis Obispo, seven in Santa Clara, three in Siskiyou, seven in Sonoma, one in Stanislaus, two in Trinity and one in Yolo—a total of sixty-one. Of course, many of these have been but slightly exploited, while others have been practically worked out and others have been closed down owing to the low price of quicksilver.

The quicksilver prices are practically controlled by the Rothschilds, but under such conditions that no hardship is worked on the consumers. They have control of the Almaden mines of Spain and of the Idria of Austria, and from those mines could easily produce more than the world requires. Of late the price of quicksilver has gone up from $36 to $40, but if any attempt were made to largely increase the price above the last figure, many other mines now idle would be opened.

Until a few years ago large quantities of quicksilver were shipped to China and Japan from California, but that market has been entirely closed to American producers by the Rothschilds.

The output of the California mines in 1893 was 30,164 flasks, in 1894, 30,440 flasks, and 1895, 35,122 flasks. According to the most reliable estimates, the output of 1896 fell off to about 30,000 flasks.

While there is apt to be an increased demand in this country for a number of years to come, it is not likely that this will largely increase the price.



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Our latest forms go to press on Thursday evening.

J. F. HALLORAN.....General Manager

San Francisco, March 27, 1897.

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The Mineral Lands Bill.

The Mineral Land bill has again been introduced in Congress. Although the present special session will be short, and few bills not connected with the cause for the call are apt to pass, it is probable that there will be little of the old opposition to this meritorious measure, except from the railroad people, and they have lost most of the means of blocking its way that they had at the last and preceding session. But for the work of Mr. Lamoureux, the General Land Commissioner under the last administration, the bill would have been passed without difficulty. He has gone out of office under a cloud and has been succeeded by ex-Congressman Binger Herman of Oregon, who on the floor of the House was one of the ablest champions of the measure. Senator Mitchell of Oregon blocked the bill at one stage, but has been relegated to private life. The California delegation may be relied upon to do all in their power, and altogether the way seems smoothed for the bill.

Gravel Mining Failures.

Probably in no branch of mining has a larger proportion of failures been made than in working gravel. This is largely due to the fact that most of those who go into this branch of mining imagine that the problems are all simple. During the palmy days of hydraulic mining in California it is safe to say that over 50 per cent of the large undertakings did not pay. Yet of the men who were engaged in mining then those who are now working gravel make few failures. They have learned hard lessons. With no authorities to fall back on, and no past experience with large hydraulic pipes, big ditches and flumes and under currents, they were compelled to work out their own problems. They built up a system of hydraulic mining that is the standard the world over. So it is with drift mining.

Yet of those who have been opening up gravel mines in other States and Territories, few take advantage of what has been learned here and employ California miners; but, assuming that their enterprises are simple, employ surveyors or civil engineers without experience in the kind of work to be done. As a result, failures are being continually recorded.

In working dredgers there has been considerable success for many years in New Zealand while in British Columbia, Idaho, Montana and elsewhere many dredgers have been built which have proved to be failures. Upon the Fraser river in British Columbia, a great deal of money has been lost in this way. At Marsh, Idaho, a big mining dredge boat which cost $35,000 and which never realized a dollar in profits is being dismantled. It is probable that had information been obtained from New Zealand where this class of work is understood better work would have been done.

Mr. Crawford's Work.

Next Thursday Mr. J. J. Crawford, the State Mineralogist, will turn over his office to his successor. The mining industry of California owes to Mr. Crawford considerable for the work he has done that has been of real value. Too often public bureaus such as this are given to wasting opportunities by issuing data of more value to the future historian than the worker of the present. Then, it is often the case that work done is of too scientific a nature, or, in other cases, there is not enough of the economic scientific work that is of most value, for the reason that the data so gathered is not otherwise obtainable. In no country in the world is so much done by the Government for the people in the way of publishing information for the good of different industries as in the United States. Heretofore too large a proportion of the work done by the Federa government, or by the different State governments, has been done by men who could not appreciate the fact that the purpose of the work intended to be done was much more economic than scientific. This has been the trouble with the United States Geological Survey until the present director took charge.

In the State bureaus, and especially those which have to do with geology and mining, while the intent of the laws establishing them have been good, the value of the work has often been questionable, simply because politics has had too much to do with the choice of men and the reports have been padded with worthless material. It is all very well to talk of doing "practical" work, but, after all, the practical work that will be worthy of confidence must be done by men of education as well as practical experience. In mining, more than in any other industry, science plays a large part. The best miners the world over to-day must know something of geology, mineralogy, chemistry, civil engineering, mechanical and electrical engineering.

Copies of the bulletins published by Mr. Crawford have been called for by miners, not only all over California, but in all the mining districts of the world. Their preparation has required the assistance of men of education as well as experience. These are: "Methods of Mine Timbering," "Gas and Petroleum Yielding Formations of the Central Valley of California," "Catalogue of California Fossils," "The Cyanide Process," "Notes on Gold Milling Practices in California," "Mineral Statistics of California for 1894 and 1895," "Mine Drainage, Pumps, etc.," "A Bibliography Relating to the Geologic Paleontology and Mineral Resources of California," and, about to be issued, "Oil Yielding Formations of Los Angeles, Santa Barbara and Ventura Counties." Besides these in the twelfth and thirteenth reports are many other articles on special subjects connected with mining, written by authorities, a full list of which would show that a great deal of high-class work has been done.

Hydraulic Miners and the Association.

The California Miners' Association, it is announced, is out of funds, and the various county organizations have been requested to send in their pro rata amounts as soon as possible. In this connection, President Neff suggests that those who are now working hydraulic mines under permits from the United States Debris Commission—some 230 in number—be asked to come forward at this time with a special subscription, to show their appreciation of the good that has been done for them by the Association. But for the California Miners' Association none of these 230 mines would be running to-day.

More than that, mainly through the efforts of the California Miners' Association, large appropriations have been made by the State and Federal governments to build restraining dams, the State has appropriated a large sum for dredging the Sacramento river and good feeling has been brought about between the miners and the farmers. It would appear that the outlook for much further increase in hydraulic mining and under easier conditions is very bright. Certainly, some recognition of this work of the Association should be made by the hydraulic miners as a body.

Value of Stock Gambling to Deep Mining.

It has always seemed strange to the mining world that in California, in proportion to the amount of work done, there has been less deep mining than in other and smaller districts. What makes this particularly remarkable is the fact that to California the mining world turns more than anywhere else for its best mining engineers. Probably the chief reason why there has been so little deep mining on the so-called mother lode of California is the fact that there has never been offered by the public, through stock speculation, large sums to be expended in bold ventures, as there has been in other districts in the world. Nearly all the work that has been done in quartz mining in California has been undertaken by private individuals, or by a few men united in close corporations, who could not afford the risks of bold undertakings. In nearly every California mine the owners have sunk from level to level only upon finding ore as they go down. The discovery of ore on one level has given them confidence to sink to the next. Of the profits from the upper levels, little has ever been laid by for working capital to enable them to undertake extensive explorations.

It was much the same in Rhodesia in South Africa, where those who first went in, stripped the surface and paid out their profits in dividends, but put nothing aside for working capital. As a consequence they did not go very deep and the question as to whether the mines would pay in depth was not solved. In New South Wales it was the same—the mine owners working from level to level as ore was discovered, but never putting money aside for large developments.

But on the Comstock there was as bold mining as was ever done in the world, and all in spite of greater difficulties and heavy expenses for water, wood and machinery. The reason for this was that the speculative public was back of the enterprises, and there was no end of money to be obtained. The public was indifferent to the cost, most of the individuals buying in to-day and selling out to-morrow, caring little as so what the future of the mines would be. But the California mines were never on the stock market and consequently never backed by the general public, as were those of the Comstock.

The Rand mines of South Africa are a good illustration of how much more the public, who know little about mining, can do in the way of bold mining, than can the real miners with their small capital. It is true that a large proportion of the speculative public lost money in the Comstock and on the Rand; so, too, will probably the London public lose money in Western Australia; but altogether the world will be benefited.

It now looks as if there would be struck a happy medium in mining in California. There is now a great deal of capital ready to be invested in mines, just as there was in earlier years in California immense sums invested in wheat growing, and later in viticulture, and still later in horticulture. With a better knowledge of mining and of the mines than is possessed in any other mining district, it is probable that the industry in this State will be carried on upon much more business-like methods than it the in the past, either here or elsewhere.

In Amador and Calaveras counties during the past two years companies have either expended or made arrangements to expend between two and three million dollars in sinking deep shafts. In some of these cases it will be necessary to expend as much as a quarter of a million before determining whether there is any ore in the properties; yet the success which has been met with in those that have been sunk in the neighborhood makes it almost certain that, taken altogether, there will be an immense profit made upon the money expended.

THE work of the California Mining Bureau will not be hampered by a decrease in the appropriation, for the Legislature has included in the levy $50,000 for the two coming fiscal years. Mr. Cooper, the new State Mineralogist, will take office on the first of April. Already Mr. Watts and Mr. Fairbanks have been sent out by Mr. Crawford at the request of Mr. Cooper to examine into the oil fields of Los Angeles and San Luis Obispo counties.

Concentrates.

WATER is now only 1½ cents a gallon at Johannesburg, Cal.

A ROOP patent roaster is to be added to the Everett, Wash., smelter.

THE Nevada Queen mine at Tuscarora, Nevada, is to be started up again after years of idleness.

IN February there were seventy-seven mining locations filed with the recorder of Riverside county.

IN Brown's Valley, Yuba county, Cal., George Smethurst has discovered a quartz ledge in his grain field.

IT is reported that the Union Pacific proposes to run a branch road into the Deep Creek district in Utah.

A DEPOSIT of asbestos, which is claimed to be 300 feet wide and 2000 feet long, has been discovered at Badger, Colo.

STEAMERS from Puget Sound, Wash., bound for Alaska, are unable to carry all those who want to go north to the mines.

A CORPS of experts, under Victor Clements, are making an examination of the De Lamar property, in Lincoln Co., Nevada.

AT Johannesburg, South Africa, Puget sound fir sells for from $180 to $280 per 1000 feet, according to condition and grade.

THE new stock exchange at Rossland, B. C., will be incorporated soon and is expected to be ready for business by April 1.

PETER A. HART has purchased a one half interest in the Bella Union mine on the American river, near Auburn, Cal., for $4000.

FIFTEEN miles from Randsburg, Kern county, Cal., a discovery of coal was made last week and men have been sent out to exploit it.

THE Ploche, Nev., *Record* says that the chance of men being put to work is frustrated by the refusal of the lease of the smelter and other property there.

THE legislature of Nevada has passed an act to incorporate the town of Reno, and authorizes the issuance of bonds for water works and an electric light plant.

NO LESS than fifty-one locations of mining claims were filed with the recorder of the Randsburg district, Kern county, Cal., for the week ending March 12th.

THE Southern California Railway Company has contracted for 5000 barrels of oil from the Summerland, Santa Barbara, district, to be delivered in Los Angeles.

THE anti-debris people are endeavoring to have the Spring Valley mines at Cherokee, Butte county, closed down and the permit revoked by the Debris Commission.

IN the Summit mine, in Nevada county, Cal., last Monday, the machine drill opened up a large flow of water, that rapidly begun to fill the mine. Larger pumps have been ordered.

THE Goodwill tunnel, which is being run into Gold hill at Cripple Creek, Colo., was begun January 2nd with machine drills, and an average of 13¾ feet was made for fifty-six days in granite.

THE Puente, Los Angeles county, Cal., oil wells supply the Chino sugar factory with 80,000 barrels of oil per year. This is the residue after extracting the gasoline, refined petroleum and benzine.

AT the Butte & Boston Company's smelting plant in Montana converters will soon be put in, and when the company starts up its plant the product will be blister copper instead of matte as heretofore.

OIL PRICES at Los Angeles continue to rise and it is now selling at $1.60 per barrel, which is nearly four times as much as the price of a year ago. At $1.60 the cost is equivalent to coal at $6 a ton.

DIVIDENDS have been publicly declared by Utah mines this month to the amount of $176,500 and according to the Salt Lake *Tribune* the amounts divided by close corporations will bring the total up to $250,000.

THERE is a proposition on foot to go on with the boring of a tunnel under Sunset peak, in the Cœur d'Alene country, Idaho, for which surveys were made some two years ago. It would tap some fifteen mines.

THE second largest sale that has taken place at Rossland, B. C., is that made last week of the Columbia-Kootenay group, which was turned over by the Chicago owners to F. Aug. Heinze and his associates for $500,000.

THE Santa Maria Asphalt Company, in Santa Barbara county, Cal., has agreed to sell to the Consolidated Asphalt Company of Los Angeles 300 acres of asphalt land in Santa Barbara and San Luis Obispo counties.

THE Union Hill Mining Company at Deadwood, South Dakota, have let a contract to Fraser & Chalmers for the erection of a 200-stamp mill at Galena. This, next to the Homestake, will be the largest in the Black Hills.

THE Canadian Pacific Railway Company is advertising in the British Columbia papers for bids for the grading of the Slocan branch of the Columbia & Kootenay Railway from the bridge across the Slocan river to Slocan City, a distance of about thirty-one miles.

THE value of the ore and bullion shipped from the Kootenay mines from the 1st of January to March 13th of this year was $1,814,272.31. At this rate, and there is no reason to believe it will not at least be maintained, the year's output would amount to about $9,500,000.

ACCORDING to the Butte, Montana, *Inter-Mountain*, it is reckoned that every cent decline in silver entails a loss of $50,000 a year upon the Anaconda Copper Mining Company. The company is said to have purchased a valuable copper property in British Columbia.

TELEGRAMS from Yuma, Arizona, announce that there is some excitement over the gold discoveries near Tacna station, and that a number of capitalists and representatives of capital have gone out to them. Many men and teams have left Yuma for the new mines.

JULIAN SONNTAG has, at the earnest request of President Neff, withdrawn his resignation as secretary of the California Miners' Association. A press of private business was the only reason for Mr. Sonntag's desire to give up the position in which he has done good work.

IT is understood that the Government will clear the Lardeau river from obstructions this summer, which will open up the mineral country about Howser lake, British Columbia. Then a railroad is promised by the Horne-Payne syndicate from the Columbia river to Trout Lake district.

THE official returns of the gold production of Tasmania show an output of 62,586 ounces, valued at $1,142,295, an increase of $131,160 over that of 1895. The complete official returns from the seven Australasian colonies show an output of $44,455,000, an increase of $1,061,000 over that of 1895.

THE following from a cable from the manager of the Hauraki, a Victorian gold mine, shows great profits in deep working: Total amount crushed (four weeks), 300 tons; ounces of gold, 1330. Costs, including repairing plant since fire, $10,000; profit, $10,000; 3000-foot level now being drained.

AT West Point, Calaveras county, Cal., Dr. C. E. Congdon has deeded to J. C. Cramer the Silver Mountain mine for $80,000. Mr. Cramer represents Minnesota capitalists. The property consists of a mountain of porphyry. Tests which have already been made indicate a value of from $3 to $4 a ton.

THERE is being floated in London the Gold Fields of British Columbia, Limited, capitalized at £600,000, to take over and work the Albert Canyon and Dowie Creek groups, the Channe properties, Chrome valley claims, Flossie L. mine, Little Darling and other properties in the Trail Creek and Rossland districts.

F. August Heinze announces that he will extend his railway at once from the Columbia river at Robson, B. C., to Pendleton, and thence to the coast. A bill has been introduced in the Dominion parliament at Ottawa for a charter to build a railroad from Golden to Fort Steele, in the Kootenay country.

THE net profits of the mines of Cripple Creek, Colorado, is placed at all the way from $200,000 to $300,000, on a total output of about $1,000,000 a month. Considering that a large proportion of the mines are in process of development, and but a small percentage paying dividends, this speaks well for the industry.

THE Montana Ore Producing Company has mortgaged its Silver Bow, Montana, possessions to Richard Lacy of New York for $1,000,000 worth of bonds bearing 6 per cent interest and running 20 years. The money realized is to be used by the company in acquiring other property and making improvements on what it already has.

A LEADING consulting engineer in London says that of all the vast capitalization of South African and West Australian mining companies, amounting to hundreds of millions of dollars, probably at least 50 per cent is watered stock, that less than 10 per cent of such companies will be successful and that 90 per cent will prove failures.

SPEAKING of the end of the strike at Leadville, Colo., the Denver *Republican* says that the place may look forward to a period of prosperity and that it is to be hoped that in the future more attention than heretofore will be given to the Leadville gold belt. It has been claimed that this belt is as valuable as the one at Cripple Creek.

ON the Golden Gate mine at Mercur, Utah, Captain J. R. De Lamar has blocked out ore bodies estimated to be worth several millions, and in doing this he has expended nearly $400,000 without taking out a dollar's worth of bullion. The erection of a mill and accessories for working the ore will bring the expenditure to some $600,000.

COLONEL TURNER of the Le Roi mine, at Rossland, British Columbia, in denying that the property had been sold last week to the Rio Tinto Company of Scotch capitalists, said that negotiations had been opened some time ago by that company and they had been given a verbal offer of the mine for $5,000,000, but so far had not come forward with a forfeit.

AT Bingham, Utah, a project is on foot to tunnel Markham hill for purposes of drainage and to give an outlet to the mines. It would intersect the veins of the Ruby, Native, Tough Nut, Red Wing, Julia Dean and Markham group mines, etc., reaching as far as the Montezuma, a distance of 2500 feet, and tap the latter at a depth of 1000 to 1200 feet.

A TELEGRAM from San Diego, Cal., announces that Col. E. W. Sebens, of Denver, Colo., had closed a deal by which an English syndicate purchases the Golden Cross group of gold mines at Hedges, near Ogilby, on the Colorado desert, for $1,500,000, the new company to take possession within sixty days. San Francisco parties do not confirm this statement.

THE last Congress made appropriations for the Carson Mint as follows: Superintendent, $3000; assayer and melter and refiner, $2500 each; chief clerk, $1800; bookkeeper, cashier, assistant assayer, assistant melter and refiner and weight clerk, $1500, or a total of $17,300. In addition to this, $4000 was appropriated for incidentals, wastage or loss in sweeping, etc.

THE Mammoth, Utah, *Star* is trying to get up a case to test the constitutionality of the new mining law passed by the Legislature over the Governor's veto. The two main grounds for objection are that all locations must be recorded with the county recorder instead of, or as well as, the district recorder, and that assessment work must be done within ninety days of location.

ROSSLAND, British Columbia, which is only two years old, claims a population of 8000. There is a continual stream of new comers to the place, largely of men who will not be a burden but rather an advantage to a new country, and the promises are that with the advent of English and other foreign capital a large increase will be made in the population during the year.

A TELEGRAM from Seattle, Wash., states that R. A. Lane and other Boston and San Francisco people, who had chartered the barkentine Bertha at San Francisco, had arrived there last week and employed 100 laborers to work upon a nine-mile ditch to be dug at Cooks Inlet, Alaska, in furtherance of a project to hydraulic twelve square miles of placer ground in the vicinity of Anchor Point, Turn Again Arm.

THE opening up of the Belknap reservation in Montana last week created little stir. There has been no greater rush for those who had prospects located than before the President signed the treaty, and under the provisions of that act all those who in good faith made locations on the reservation before the bill was signed are entitled to a 90 days' preference right to make good their locations after the land is officially opened up.

THOMAS TONGE, a well known writer on mining matters and an Englishman, in returning to Colorado from England, spoke of the London promoter and said: Colorado's mining industry has had an escape in consequence of the professional promoters in London having for the past year or two practically confined their attention to South Africa, Western Australia and other places. The peculiar methods of the average London promoter can only result in loss to the actual investor, or rather "speculator," and in discredit to the mining district where the properties are located. No matter what the property, the first move of the average promoter is to arrange for an excessive profit for himself, involving serious over-capitalization.

THE report of the Atlantic Mining Company of Michigan, for the year 1896 shows that the production of mineral was 6,449,660 pounds, which yielded 75.88%, or 4,894,228 pounds of refined copper, for which an average of 10.84c per pound was realized. The receipts for copper sold were $530,667; interest received, $494; total, $531,161. The working expenses at mine were $394,379; smelting, freight and other expenses, $64,830, making a total of $459,209, and leaving a profit of $71,952. To this is to be added $3185 received for stumpage on the company's property, making a total of $75,137.

THE following are the items in the proposed new tariff bill before Congress, as scheduled by the House, where debate is now going on: Lead-bearing ores, 1 cent per pound on the lead contained. Lead duties are to be estimated at port of entry, bonds given in double the amount and the duties liquidated in the end after Government assay. Lead dross and refuse lead, 2 cents per pound; sheet, pipe, shot, etc., 2½ cents; metallic minerals, crude, including monzanite sand, 20 per cent; mica, 3 cents per pound and 15 per cent; nickel, 6 cents per pound; quicksilver, 10 cents per pound.

THE railway committee of the British Columbia Degislature has reported favorably upon the applications for charters for seven different proposed railways. They are the Victoria, Vancouver & Eastern, to operate from the two first-named cities into the Kootenay country by way of Fair View, Grand Forks and Christina lake; the Nanaimo-Alberti, the Cassiar Central, the East Kootenay & Lardeau, the Stikeen & Teslin Lake and the Bedlington & Nelson. Of these, the first which has the necessary capital on hand, the Bedlington & Nelson, backed by the Great Northern, will start work at once.

THE yield of minerals in Idaho for 1895 has been calculated by the superintendent of the United States assay office at Boise. There was a falling off in the product of gold, but a much larger increase in that of silver and lead. For 1895 the gold yield was $2,594,666 and for 1896 $2,323,700. The silver yield for 1895 was $5,214,498 and 1896 $6,474,765. Of lead, the yield for 1895 was valued at $2,301,321 and for 1896 $2,953,380. The total for the three metals for 1895 was $10,110,485 and for 1896 $11,751,845. There is such a considerable increase in activity in the Cœur d'Alene country, and of placers in different parts of the State, backed by capital, that it is probable that this year's yield of gold will exceed that of 1895.

THE new tariff bill has some provisions of interest to miners and metallurgists, more particularly those relating to the proposed duty on lead and lead ore. Another matter in which manufacturers on this coast are interested is the evident intention of the framers of the present tariff bill to wipe out the rebate provision in the duty on tinplate. At present there is a rebate of 99% on all re-exported tin. In '96 there were 6,192,026 boxes tinplate used in this country, of which 2,369,540 were imported. This imported tin, when made into cans for fish, meat, oil, etc., and exported, secured a return to the American canners of the duty paid thereon. One company in '96 collected over $1,500,000 in rebates on tin thus re-exported.

THE number of inquiries daily received at this office is great. They comprise a variety of subjects. During the week just past, have been received inquiries from nine States, and three foreign countries, asking for information about books, the cyanide process, mining laws, electric furnaces for the manufacture of iron, pyritic smelting, the mother lode, geology of California, manufacture of sulphuric acid, how to construct gold saving riffles, makes of steam shovels and amalgamators, asbestos deposits, gas engines, the Peck centrifugal process, copper in Nevada, California mica, telluride, dry washers, arrastras, electric pumps, diamond drills, mining reports, river dredger, mine boring, hydraulic elevator, chrome iron.

AN agreement was entered into last year for the purchase of 400,000 shares of stock in the Elkton property at Cripple Creek, Colo., ostensibly for a French syndicate, and with the understanding that it was to be placed in France. According to the Denver *Republican*, the stock which was handled by Colorado Springs people has all been thrown on the local market and heretofore the syndicate working the deal has been able to resell the stock at a handsome profit, the constant improvement in the property making an expansive market that would absorb the large blocks when the syndicate found it advisable to sell. After taking 300,000 shares in this manner and rehandling them at a profit of from 20 to 50 cents a share to the syndicate, the market has apparently been filled up, and now the syndicate with its last 100,000 shares on hand finds the price dropping.

ON the 23rd inst. Senator Perkins introduced in the Senate the California mineral lands bill, practically the same as that in the last Congress, which failed after passing both houses, but with amendments in the Senate. The present measure provides an appropriation of $40,000 to carry out the provisions of the act. It is set forth that there shall be a board of three commissioners appointed in each land district of the State to determine the character of the lands as to mineral or agricultural uses. Provision is made for the taking up of mineral lands, wherever determined, and also for the separation of such lands from railroad grants. The championship of Dubois of Idaho and Bowers of California will be missed, but their loss will be offset by the absence of Secretary of the Interior Smith and Commissioner of the Gen. Land Office Lamoureux, two of the trinity that beat the bill in the 54th Congress. With the exception of the Speaker of the House, the attitude of the new administration is friendly to the miners.

THE Territorial Legislature of New Mexico has passed a new law, as to locating and obtaining titles to mining claims, that is in line with the work done by other Legislatures in the West, excepting that of California. As to the marking of the claims, it is provided that locators shall cause the surface boundaries of each claim to be plainly marked by eight substantial posts or stone monuments, each projecting at least 3 feet above the surface of the ground, to-wit: One at each corner of said claim and one at the center of each end and side line thereof, each of which posts or monuments shall be plainly marked, so as to show the name of such claim and the direction thereof from each post or monument. The California law just adopted leaves the marking of the boundaries necessary to be made to be decided by the courts in the future, as in the past, and, as a consequence, there will be the same amount of confusion and litigation. The new Territorial law also prohibits the relocation of mines by previous owners, and compels locators to do assessment work within ninety days. Altogether the law is practically the same as that proposed by the MINING AND SCIENTIFIC PRESS last October, much of the language being quoted verbatim.

Notes on the Cyanide Process.

In the issues of this journal of dates Dec. 19, Dec. 26, 1896, January 2, 9, 16, 23, 30, Feb. 6, 1897, appeared an article on "The Solution and Precipitation of the Cyanide of Gold," by S. B. Christy, Professor of Mining and Metallurgy, University of California, Berkeley, Cal., which has attracted unusual attention everywhere. It was published from revised proofs of the paper read at the Colorado meeting of American Institute of Mining Engineers, Sept., 1896.

Under date of March 15th, 1897, Mr. J. E. Clennell, of Salt Lake City, Utah, contributes the following notes on Prof. Christy's article. They are in the form of a letter to that gentleman, and that form is preserved in the following, which, alike with the original article is of considerable interest:

Prof. S. B. Christy, University of California, Berkeley, Cal.—DEAR SIR: After perusing your interesting and valuable contribution to the literature of the cyanide process, I beg to submit the following notes suggested by various portions of your paper. I am well aware that the experiments made in our laboratory at Johannesburg, to which I draw your attention, were not carried out with the scientific accuracy which is possible at a well equipped university, but they were nevertheless regulated as far as possible by the conditions of actual work, and may therefore be of some interest to practical metallurgists.

I entirely endorse your remarks as to the difficulty of handling zinc-ferrocyanide, which would be nearly always formed in practice. In laboratory experiments I have sometimes succeeded in getting this precipitate to settle by adding powdered chalk to the slightly acidulated solution.

The practical recovery of cyanide from very dilute solutions is still, to my belief, an unsolved problem; where it is possible to use the same solutions repeatedly, this recovery, of course, is not of much consequence.

Action of Oxygen in the Solution of Gold.—Your conclusions are entirely borne out by our experience. The rate of solution in all cases where definite results could be obtained appears to depend upon the freedom of access of air. In three parallel sets of experiments, in which equal weights and surface of gold foil were exposed for an equal length of time to equal quantities of the same strength of solution, in watch glasses, flasks, and test tubes respectively, we found that the amount of gold dissolved was greatest in the watch glasses and least in the test tubes. In forty-eight hours nearly double as much had dissolved in the watch glasses as in the test tubes.

In practice we once or twice attempted to use solutions containing alkaline sulphides, which would of course, readily absorb any oxygen present in the liquid, and always got very poor results, sometimes no extraction at all.

With regard to the use of oxidizing agents in practice, we have seldom come across any ore which could not be extracted as effectually without them, provided sufficient time of contact was given.

The ultimate percentage of gold extracted and the ultimate quantity of cyanide consumed is practically the same, with and without the oxidizer, when the reaction has been carried to its limits; *i. e.* when in both cases all the gold capable of being dissolved in cyanide has been extracted. The only use of oxidizing agents seem to be to accelerate the action, and it is obviously a matter of no moment whether the gold is dissolved in one hour or in twenty-four hours, when the mechanical process of leaching requires thirty-six hours.

There is apparently an exception to this in the case of certain ores containing mispickel or other substances liable to yield alkaline sulphides on treatment with ordinary cyanide, the oxidizing agent tending to prevent this result. With ordinary pyritic concentrates we found no advantage except rapidity of solution. The oxidizing agents principally employed were ferricyanide, permanganate, and persulphate of potassium. A few tests were also made with sodium peroxide.

The Bromo-Cyanide Process.—It is not at all clear to me that the bromide of cyanogen in this process does not act indirectly as an oxidizing agent. Undoubtedly, as you state, an immediate decomposition occurs on mixing solutions of potassium cyanide and cyanogen bromide. In our experiments we demonstrated that cyanogen is given off in a volatile form, but whether as free cyanogen, or in combination, as HCy, could not be determined.

We have to choose between these two equations:

$$(1)\ BrCy+KCy=KBr+2Cy,$$

as suggested in your paper, or

$$(2)\ BrCy+KCy+H_2O=KBr+2HCy+O.$$

Our experiments with mixtures of KCy and BrCy showed:

(*a*) That a rapid diminution in the apparent strength of cyanide and also of BrCy took place on standing, both in open and closed vessels.

(*b*) That when the mixture was kept in a closed vessel the whole of the cyanogen originally contained in the KCy could be recovered as an alkaline cyanide by adding a free alkali.

It was also found that the addition of an alkali to a solution of cyanogen bromide decomposed it immediately, not, however, producing an equivalent quantity of alkaline cyanide, but apparently in accordance with the equation:

$$BrCy+2KOH=KBr+KCyO+H_2O.$$

Whether a cyanate is actually produced or not I had no means of definitely determining, but the mixed solution gave with $AgNO_3$ an immediate white precipitate insoluble in an excess of the mixture, showing that a cyanide could not be present.

Assuming that the addition of the cyanogen bromide to potassium cyanide in aqueous solution may give rise to the formation of oxygen or some readily decomposed oxy-compound, the solution of gold may be, after all, in accordance with Elsner's equation in two stages, thus:

$$(1)\ BrCy+KCy+H_2O=KBr+2HCy+O;$$
$$(2)\ 2Au+4KCy+O+H_2O=2KAuCy_2+2KOH.$$

In the ideal case where the gold is present exactly in equivalent proportions, and in a condition to combine as fast as the cyanogen compounds are decomposed, we might combine these two reactions and obtain the result expressed by Mr. Sulman's equation,

$$3KCy+2Au+BrCy=2KAuCy_2+KBr.$$

In practice, however, the first reaction would always go on to an enormous extent in excess of the second. There is, accordingly, always an excess of (hydrocyanic) acid present after the reaction is complete, so that the second equation ought possibly to be expressed as follows:

$$2Au+2KCy+2HCy+O=2KAuCy_2+H_2O.$$

According to Sulman, the thermal energy theoretically developed by his supposed reaction is less than that in Elsner's. If this is the case, it is somewhat difficult to account for the greater energy with which gold is attacked by the bromo-cyanide mixture as compared with ordinary cyanide.

I should be greatly interested to know if you have obtained conclusive proof of the liberation of cyanogen by the addition of KCy to BrCy.

We did not find any marked difference in their effect upon ores between bromo-cyanide mixtures and equivalent mixtures of KCy with ferricyanide or other oxidizing agents.

In regard to the formation of paracyanogen, we found that although this took place to a considerable extent when bromine was added gradually to an excess of potassium cyanide solution, it did not occur when the addition was made in the opposite way, namely, when potassium cyanide, in moderately dilute solutions, was added to an excess of bromine until the color of the latter was just destroyed. The bromide of cyanogen thus produced was tolerably stable, and, unless mixed with cyanide solution, did not deteriorate in strength to any very marked extent in the course of two or three days. We generally used a mixture of two parts KCy to one of BrCy (in accordance with Sulman's equation), which was either prepared just before using or formed in the one itself by running on the separate solutions.

Re-treatment of Imperfectly Roasted Material.—We made a number of experiments on this subject, but the results obtained were very variable. In some cases, where a thorough preliminary washing with water and sometimes with dilute acid was given, it was found possible to extract a fair percentage of the gold, which had resisted chlorination, by treating for a long time with dilute cyanide solution, but I do not think it likely that the action was aided in any way by the presence of free chlorine remaining in the tailings. In the first place, the iron compounds, etc., in the imperfectly roasted material would destroy any excess of chlorine; and if such did remain, it would be assuredly removed by the preliminary washing which, as you point out, is necessary before adding cyanide.

In one set of experiments on the cyanide treatment of concentrates, while from thoroughly roasted material we got an extraction of nearly 90 per cent, from imperfectly roasted material of similar character we obtained, after twelve days' treatment, and notwithstanding a thorough preliminary water and alkali wash, extractions varying from 24 per cent to 35 per cent only.

Solubility of Gold Sulphide in Cyanide.—We have not made any experiments bearing directly on this subject, but our experience as to the difficulty of precipitating gold from cyanide solutions by sulphydric acid is similar to yours. We found that alkaline solutions gave no precipitation at all, while even from acidulated solutions the precipitation was very imperfect.

Estimation of Gold in Cyanide Solutions.—With regard to the estimation of the quantity of gold in cyanide solutions, we found the results obtained by slow evaporation of the solution with litharge and fusion of the residue with a reducing flux to agree perfectly with results calculated from the difference of the assay of ore, or other material tested, before and after cyanide extraction.

The process is tedious, but with solutions weak in gold is more satisfactory than evaporation on lead foil. The method suggested by Crosse of precipitation with silver nitrate, also gave correct results when carefully executed, but was more troublesome when a large number of determinations had to be made. I see that you have used the same principle. We tried the method you describe of acidifying with sulphuric acid, and boiling, but could not obtain reliable results. We also tried precipitation with sodium amalgam, but the results were uncertain.

Precipitation of Gold from Cyanide Solutions.—We made a considerable number of experiments on precipition by means of charcoal, and salts of copper, mercury, lead, etc. In ordinary solutions the gold was precipitated, although imperfectly, by agitation with finely divided charcoal. The other reagents, when used singly, gave little or no effect. A mixture of charcoal, however, with either silver nitrate, copper sulphate, or ferrous sulphate, gave in many cases an almost complete precipitation. On the whole, the combination of charcoal and copper sulphate gave the best results. The effect was practically the same whether the solution was acid or alkaline, and whether the reagents were added together or separately.

The reaction appeared to be complete after about 1½ hours agitation. The solutions used were the dilute cyanide liquors from the Siemens & Halske process and contained originally from .0001 to .0004 per cent of gold.

The methods of precipitation with cupric sulphide and cuprous chloride are new to me, and very interesting, though in South Africa, at all events, the cost of free sulphuric acid would be a fatal objection to their use, except for laboratory purposes. I had seen Prof. de Wildes' patents, but had not paid much attention to them, regarding his methods as impracticable.

Electric Precipitation.—The theoretical objections which you urge against the Siemens & Halske process have not prevented its successful operation on an enormous scale in the treatment of tailings and slimes in South Africa. The necessity for a large surface has been met by the use of very large precipitation boxes, or by the employment of lead in the form of thin strips. The action of the solution on the iron anodes is of little practical importance, and the precipitate settling from the electrolyte, to which you refer, is recovered and treated after a cleanup, which is necessary only at long intervals. Although, as you remark, great technical skill was necessary in the initiation of the process to overcome these and other difficulties, the practical working at present does not involve any higher degree of skill or knowledge than the handling of the zinc shavings in the MacArthur-Forrest process, and is entrusted to foremen with no special knowledge of chemistry or electricity.

Precipitation of Zinc.—Your discussion on this subject seems to give a plausible explanation of the observed facts, viz: the incompleteness of the precipitation when the quantity of free cyanide is insufficient, the evolution of hydrogen, the increase in the alkalinity, and the large consumption of zinc in excess of that theoretically required by the substitution reaction. If you will refer to the article published by Mr. Butters and myself in 1892, from which you quote, you will find that we had drawn attention to the insufficiency of the substitution reaction, though some of the views put forward by us at that time were doubtless erroneous.

Where insufficient free cyanide is used we have sometimes observed the deposition of a white substance which proved to consist mainly of ferrocyanide of zinc.

Recovery of Cyanide by Precipitation with Zinc Sulphate.—This matter was investigated by several chemists in South Africa at an early date, and together with the method by precipitation with ferrous-sulphate formed the subject of a patent applied for in the Transvaal, by Wm. Bettel, I think in 1893. It could hardly be carried out in practice with the immense volumes of dilute solution which we have to handle, and any process involving the use of mineral acids is of course out of the question.

Trusting that an interchange of ideas on these subjects may be of mutual benefit, I am

Yours faithfully,

Salt Lake City, Utah. J. E. CLENNELL.

Why He Can't Sell.

An export house received advices by last mail from their traveler in the River Plate saying: "The reason why I can not send you orders for certain classes of merchandise is that my prices are higher than those being offered here by English and German houses on similar goods. You have sent me a large catalogue of a jobbing house, which has a very complete line in railway supplies, tools and machinery, with prices and discounts. This catalogue is good enough to take orders from, but to be able to sell at the discounts which this firm has given us is impossible. I lost an order for a quantity of railway track material by being 12 per cent higher than an English salesman. The party that bought the goods kindly informed me that they had saved upward of $650 by

not giving me the order. Three days ago I also lost an order for three hoisting engines, which an English maker obtained. In this way I could relate a number of instances in which my prices have not been right. Let me impress upon you that it is of the utmost importance that, in sending me prices and discounts, it should be from the manufacturers, and not from wholesale jobbers, particularly in this line, for the European competitors are in this market strongly looking out for anything in the engineering line, and made of iron and steel."

Tendency of English Capital.

State Geologist Rickard of Colorado has recently returned from England, and in a published interview is credited with saying:

"There is no doubt that there is a very strong undercurrent of feeling in mining circles favoring investment in American mining properties. They have dumped a great deal of money in South Africa and West Australia, and there is a lull in those directions, which will probably receive very little new capital, comparatively, after this. It must not be understood, however, that all the money represented by the capitalization of these companies has been expended in South Africa and West Australia. A great deal of it is left in the shape of uncalled capital, that is, capital subscribed but not paid in, which can be used in other directions, as the law governing the formation of the joint stock limited companies permits the calling in of the entire amount of the capital subscribed. The tendency toward investment in this country is tempered somewhat by the remembrance of President Cleveland's Venezuelan message and the attitude of the Senate on the arbitration treaty. Besides this, a great many people who have invested in American railroad securities are not at all satisfied that they have been treated fairly. They do not take into consideration that American investors were treated just as badly, but charge their losses to sharp practice on the part of Americans. But the amount of money that is coming into England from investments in all parts of the world is so great that they must find new channels for investment, and I am of the opinion that the example of the London Exploration Company, which has made such heavy investments in this country, will be very generally followed by the other syndicates that have been formed there for the purpose of investing in mining properties. The interest paid on government securities is so low that there is a disposition to take some risks in investments that promise to pay more, and America is the only mineral field that has been left untried."

Imprisoned in Mexico.

Under date of the 13th inst., W. Viggers writes from Durango, Mexico: Two years ago last Feb. 12th, I with three others was incarcerated here in Durango under charges of robbery, preferred against us by the then U. S. Consul of this place. We appealed to our respective Governments, English and American; the U. S. sent down Mr. R. S. Chilton, chief of the consular bureau, to investigate the action of the Consul, J. S. McCaughan, who did so, and found them grossly fabulous, and demanded his immediate resignation, but the case not being a political one, the Governments could not further interfere, and thus the case has been dragging along. Both Governments have protested from time to time of the delays, but nothing more tangible than this has been done by the Governments, and, furthermore, the influence of the Governor was thrown against us. The early part of last month, however, the Governor died, and I am now informed that as this trammel no longer exists we can reasonably expect a decision within thirty days. The MINING AND SCIENTIFIC PRESS has been a source of great comfort and has relieved many of what otherwise would have been long, weary hours in this Mexican jail.

The Gold Fields of the Porce River, Colombia.

The Republic of Colombia has long been known to the Spaniards and their descendants as being exceedingly rich in its deposits of gold; but, owing to its geographical location and its climatic conditions, it was only during the past few years that it began to attract the attention of the world at large.

The old Spaniard, who was a wonderful seeker after gold, knew the value of the Colombian mines, and he drew largely from them in gathering the wealth that went to enrich the "mother country" during the palmy days following the conquest of the southern hemisphere. His descendants, too, have profited by his knowledge, and have followed in his footsteps in taking from the bountiful stores that Nature has lavishly placed at hand; and, in almost every section of the Republic, they have continued to operate mines that, since the emancipation from Spain, have yielded, without machinery, a steady stream of the yellow metal, which has swelled the output of the country to more than $700,000,000.

Nearly every State and province in Colombia has its gold deposits, more or less rich, and from some of these deposits have come, at times, yields that almost challenge belief. The stories that have come to the outside world, from time to time, of the gold alluvions of the Darien, Choco, Atrato, San Juan, Cauca, Nechi and Porce, and the rumors set afloat regarding the fabulous richness of these fields and streams, have read for half a century like fairy tales. Yet many of these stories have a basis of truth. Explorations, in recent years, into the regions mentioned have brought to light the fact that, within their precincts, in some places, lie stores of wealth of vast extent, though formidably guarded against the encroachment of man by climatic and other conditions too deadly to face.

The State of Antioquia, though but little known, by reason of its almost inaccessible location, is perhaps the richest State, in mineral wealth, in all Colombia. Situated, it might be said, almost in the "lap of the Andes," and cross-seamed by many spurs from the parent chain, the State presents an almost unbroken area laced with gold-bearing quartz veins of great value, while many of its streams have valley deposits of placer gold of almost incredible richness. Nearly $150,000,000 in gold has been taken out of the mines of this State during the present century, although most of the workings there have generally been limited to surface deposits easy to reach. A very large proportion of this amount has been taken from placer deposits in the valley of the Porce—a river that has long been known to be exceedingly rich in gold.

This river, which seems to be of comparatively recent origin, has its source in the heart of Antioquia, near the city of Medellin, and drains northwardly, between the two ranges of the Cordilleras, through a distance of about 175 miles, to its junction with the Nechi. Through a good portion of this length it is fed by mountain streams and torrents that have cut their way, in deep canyons, across the flanks of the Cordilleras, and that bring into the valley, with their detritus, gold from innumerable veins. As a consequence, the river has, for over sixty-five miles, an almost uninterrupted series of gravel bars, or flats, exceedingly rich in gold. So rich, indeed, are some of these bars that much speculation has been indulged in relative to the source of their supply.

Mining has been carried on in the valley to a greater or less extent for over 300 years. The Indians inhabiting this portion of the continent washed out gold in a crude way, and they, of all the tribes in Colombia, had most gold to sell to the Spaniards. They frequently gave the "conquerors" twenty dollars in gold-dust for a pound of salt, and seventy dollars for a hatchet, and it is said that in one of their villages the Spaniards found more than $20,000 in gold. The Spaniards mined in the valley for many years with good results, and, following them, the natives also. From 1602 to 1620 more than $6,000,000 was washed out here; and, although working has been limited almost exclusively to superficial deposits, easy to mine, the output has steadily increased, until in recent years it has been estimated to run more than $1,000,000 annually.

Individual instances of great returns for working are on record. On the lower reach of the river the natives have taken out, by diving, pans of gravel that yielded more than two pounds of gold. One proprietor, after spending nearly $75,000 for the introduction of water, washed out, in a few days, more than 10,600 ounces of gold-dust, and from a small bar in the river valley, though hardly 500 feet long by 50 feet wide, more than $200,000 was taken. At the Cristina mine, some years since, fourteen men, in thirty hours' work, washed out 118 ounces of gold, while at Barcinos 265 ounces were extracted from about 160 cubic yards of gravel. At Gunyabalito the daily yield in the winter (dry) season, with a small force of men, runs from 44 to 102 ounces; at La Llave it has run from 26¼ to 29½ ounces; at Caracoli, at Socorro Megaron, as much as 132. At San Basilio, in two weeks' work, 764 ounces of gold were taken out in the winter of 1886, and at San Jose 588 ounces were extracted in the working season of 1885.



GREAT EASTERN QUICKSILVER MINE.

(See page 253.)



ORE DRIER OF GREAT EASTERN MINE.

An English engineer of some repute examined and reported on the richness of the Porce river some years since. He estimated that the river contained gold in the proportion of 14.7 ounces per superficial square yard, and that in the lower fifty-mile reach of the river, after its junction with the Nechi, there were more than 4000 tons of gold!

The writer of this paper noticed, during his connection with the surveys of the Intercontinental Railway, the richness of some of the Porce bars, and he has recently been conducting some examinations and tests which show results in keeping with those above described.

At one place, where the bar had a formation of about six feet of loose sand (decomposed granite), mixed with boulders, and below this another formation of gravel, sand and boulders, the upper stratum showed, from the "grass roots" down, an average of $6 per cubic yard, while the lower stratum gave an average of more than $80 per cubic yard. At another place three cubic feet of gravel, taken as average from fifty different places in the lower stratum, yielded 15.81 grams of gold-dust, or about $9 in gold, there being 31.1 grams in one ounce Troy, which is valued, in this gold, at about $18.

At still another place, from 256 pounds of gravel, taken from sixteen different places, 6.4 castellanos of gold-dust were washed out. This result corresponds to a yield of nearly $200 per cubic yard, the specific gravity of the gravel being about two and the weight of a cubic foot about 125 pounds. The former result corresponds to a yield of about $80 per cubic yard. Several wheelbarrows of gravel (three or four cubic yards) at another place gave $435. One batea yielded $7.50 in gold-dust, and, out of several hundred bateas taken, not one failed to show gold in immense paying quantities. Other

tests were made with results equally startling, but those given serve to show the enormous richness of the river valley.

When one remembers that, according to Silliman, Cumenge and Lock, the rich gravel along the Yuba river and at "Pond's claim," in California, averaged only from 34 to 45 cents per cubic yard, while the gravel at such mines as Independence, Todd's Valley, Roach Hill and Iowa Hill ran only from 25 to 71 cents per cubic yard, he can begin in some measure to appreciate the enormity of these figures. The writer is constrained to admit that they read like a fairy tale; and, had not the richness of the river valley been fully demonstrated by the examinations of experts and by mining operations, he would certainly hesitate to give them. Of course, places have been found in California, and elsewhere, where the yield of gold was greater even than the figures given above. These places were known as "pockets," however, and were limited in extent, whereas almost the entire valley of the Porce seems to show the large average given, demonstrating the fact that, through exceptionally favorable conditions, the river has been for many years the reservoir for gold deposits from almost unlimited fields.

The question will naturally be asked, Why, if this river is so rich, has it not been mined out already? As before stated, mining operations have been carried on in the valley by the natives, and by the Indians before them, for more than 300 years. They have been limited, however, almost exclusively to the deposits that were inclined against the hillsides, where bedrock was above the level of the river, and to the old channels that were easy to work. These deposits have been practically exhausted. The rich deposits, however, that lie below the level of the river, and that require expensive machinery to work them, are almost intact, and they have never been worked except by the primitive method of "veraneos," common in the country, which consists in sinking, in the dry season, to bedrock a rude caisson, composed of sticks, earth and vines, and working the gravel thereby uncovered. No regularly organized scheme of mining these deposits has ever been carried out, and for obvious reasons.

Antioquia being situated far inland, and difficult of access by reason of the lofty Cordilleras on the east, south and west, and the almost impenetrable jungles and morasses of the Atrato, Cauca and Magdalena on the north, is almost unknown to foreigners, and even to the natives living on the coast. As a consequence, its mineral wealth has never been made known to the world, to attract miners, except through vague rumors that have come from an occasional wanderer who has found his way into the State by chance. And, when a foreigner, attracted by these rumors, has started to investigate them, he has usually become so appalled by the formidable obstacles presented by Nature in his path, that he has generally turned aside to investigate fields in nearer provinces, report of which has reached his ear. The entire Republic of Colombia is so rich in mineral wealth that the seeker after mines there generally becomes bewildered, as soon as he has entered the country, by reports coming to him, from almost every source, of mines fabulously rich that deserve his attention. As a result, in face of the obstacles intervening between Antioquia and the coast, he generally turns aside to other and nearer fields. The writer knows personally of several expeditions that left the States for Antioquia, and were thus diverted. In view of these facts, very few foreigners have ever penetrated to the rich mines of the State, and those that have penetrated there have usually been unable to provide the capital necessary for working mines. The natives of Antioquia are not, as a rule, mining people, and those who have means sufficient to develop a mine are generally merchants who have made their money in trade, and who are unwilling to risk it in the more hazardous business of mining. There are only a few persons in all Antioquia having as much capital as $200,000 in gold, and they know absolutely nothing of forming large stock companies, such as we have in the States. Furthermore, those that have money live in the cities on the upper tablelands, where the climate is healthy, and they are unwilling, except when necessity compels, to venture into the lower and more unhealthy mining regions of the river valleys. In consequence of this, it is only those, generally, who have to become ruined or crippled in trade that undertake mining operations to recoup their fortunes; and it almost invariably happens, with these, that, as soon as they have amassed wealth enough to return to merchandizing—no matter how fabulously rich their mine or large its returns—they either abandon the work to a foreman or lease the mine to some one they wish to befriend.

The climate, too, which is bad in the river valleys, and everywhere except on the elevated tablelands and the highways, which are almost impassable for machinery, have helped to throw obstacles in the way of mining on any extended scale.

All of these things have combined to prevent in Antioquia, and even in Colombia, a mining "boom" that would have led to the working of the alluvial deposits of the Porce. That such a "boom" will soon occur, however, is easy to be seen. The rich discoveries of silver which enriched Chili were made from 1825 to 1848; the gold alluvions of California were discovered in 1848; those of British Columbia in 1858; the rich silver mines in Nevada, which have lowered the price of silver, were discovered in 1859; those of Bolivia in 1860; the rich gold deposits of Guiana and Venezuela in 1866; and those of the Transvaal within recent years. Impelled by recent financial agitation in the States and elsewhere, the world is now "casting about" in every direction for new gold fields; and Colombia's day appears, therefore, to be near at hand.

When that day shall have come, and the present primitive appliances and methods being discarded, improved machinery and recently discovered methods of mining shall have been applied to the working of the Porce and other Colombian streams, and to uncovering and extracting the gold from the vast lodes of quartz that are now lying hidden in Antioquia and other parts of Colombia, it is no hazardous venture to say that the world will view the results with unbounded amazement.

In order to prevent a misconception of the situation, it is eminently proper, before closing this paper, to warn persons against going to Colombia to mine without reasonable means. While the mining laws of the country are exceedingly liberal to both natives and foreigners, and while there are many rich mines to be discovered and claimed in nearly every section, it is still true that in Colombia, perhaps more than in any other country in the world, money is needed, especially for mining.

As for the valley of the Porce, there is probably, in all this territory, not a yard of soil that is not already taken, and nearly all of the river bars of any value are owned or controlled by a wealthy firm of native mine owners, who do not care to sell them except for prices commensurate with their value.—J. D. Garrison in the Engineering Magazine.

Forest Reservations and Mining.

There have been attacks made upon the reservations of forests under the proclamation of President Cleveland on February 22 in all the States interested. All the papers which have opposed them have done so mainly upon the ground that the President's proclamation would prevent prospecting or mining on lands in question. Similar arguments have been advanced by Senators from all States interested except California. This contention would seem to be wrong, and it would appear that other motives inspire the opposition. The Forestry Commission in its report says:

"The Commission fully recognized the fact that the forest reserves established and proposed can not be maintained unless a plan can be adopted under which their boundaries can be modified so as to take from them all lands better suited for agriculture than for the production of forests, and under which their timber can be made available for domestic and commercial purposes, *and valuable minerals can be freely sought for and mined within their boundaries.*

"The Commission is now engaged in perfecting a scheme of forest management which it believes will make the administration of the reserves possible, and which in due time will be submitted. It believes that the solution of this difficult problem will, however, be made easier if reserved areas are now increased, as the greater the number of people interested in drawing supplies from the reserved territory, or in mining in them, the greater will be the pressure on Congress to enact laws permitting their proper administration. For this reason it is the unanimous opinion of the Commission that the establishment by proclamation of the reserves described above is now a matter of the utmost importance to the development and welfare of the whole country."

The following statement, in answer to questions about these vigorous protests against the forest reserves, is made by Gifford Pinchot, a member of the Commission which recommended the reserves, and its secretary:

"The attack on the forest reserves declared by ex-President Cleveland on Washington's Birthday is founded on a misunderstanding. There is a fundamental misconception of the objects of the reserves and the reasons why the Forest Commission of the National Academy of Sciences recommended their establishment. The members of this Commission understand as fully as any one can that forest reserves permanently withdrawn from use would be wholly unworthy of being maintained. The only reason for reserving any area must be that it will be more useful to the people as a reserve than as part of the public domain. With that idea clearly in mind, we have been considering for several months past the question of making all the reserves, both these and the 17,000,000 acres hitherto proclaimed, contribute to the utmost to the welfare of the regions in which they lie, and work on a bill for submission to Congress to open the reserves to use, while providing the necessary means for the preservation of the forest, is so far on toward completion.

"*The Commission's Statement.*—An official statement of its position was recently made by the Commission to a conference committee of the House and Senate which was considering the matter of the newly proclaimed reserves. Omitting those parts which refer to specific amendments to the sundry civil bill, in which the provision to abolish the reserves was inserted by the Senate, this statement is as follows:

"'It has never been the desire of the Commission to restrict the natural development of any resources contained in the reserves, but, on the contrary, to recommend the widest use of all their resources, mines as well as all others, compatible with the preservation of the forests upon them.

"'The Commission made its recommendations after thorough study of the data available in the Geological Survey, the General Land Office and the Department of Agriculture, supplemented by a sufficient investigation on the ground, continued through several months. There has been nothing in the nature of hasty judgment, but the decisions reached have in every case resulted from careful and adequate study of the questions involved, and the Commission desires to reiterate them here. It must not be understood that no land has been included in these reserves which should eventually be devoted to other uses. From the necessities of the case such temporary inclusion was unavoidable, and was, and is, a part of the policy of the Commission to recommend the recession of all such lands in all the reservations as soon as surveys can be made and it can be accurately known where such lands lie.

"'There is at present no legal practicable means by which small settlers may obtain from the public lands the timber which they need. Large corporations, on the contrary, through the permit system and otherwise, have excellent facilities. The intention of the Commission is to recommend such legislation as will remedy this evil.

"'It will not be denied that great good will result to the Western States, as well as to the nation at large, from the preservation of the Western forests. The chief danger to them is from fire, not from the axe. Fire can be controlled by the Government, and by it alone. It follows that Government control of certain of the Western forests is indispensable.'

"*Not to Remain Undeveloped.*—The intention of the Commission is to prepare and recommend a plan by which the whole value of the reserves may be used for the good of the people, and by which none of their resources will remain undeveloped. We have no desire to protect these forests against use, but against destruction. It must not be forgotten that the judicious cutting of the timber is essential to right forest management, and that the best of all ways to insure the protection and preservation of a forest is by use.

"The action of the California delegation in Congress shows, as well as anything can, the public approval which forest reserves have acquired in parts of the West, and their value to agricultural and other interests. By special request of the California Senators their State was omitted from the Senate amendment abolishing the reserves, and the discussion in the House showed that the California Representatives were also prepared to resent any attack upon the reserves in California. In New York the Governor has urged, and the Legislature seems about to pass, a bill appropriating $1,000,000 to purchase forest lands at the headwaters of streams, for the sake of protecting the water supply. In view of these examples of the real value of reserves in the opinion of the people, East and West, and with the knowledge that there is no desire to blockade the resources of the reserves, of whatever kind, the greater part of the irritation which has followed the proclamation will, I hope, gradually disappear. Great corporations which have been in the habit of taking vast amounts of Government timber free, under the permit system or otherwise, will undoubtedly continue to complain, but in this case it is not the infringement of any right which make the difficulty, but merely the discontinuance of a gift.

"During the discussion in Congress it was repeatedly said that the Commission had acted from too meager a knowledge of the new reserves. I want to say that five members of the Commission spent from three to four months in the field, and all of that time that was not required to move from place to place or to consult with scientific or mountain men was spent in the woods on the areas since reserved. Long trips with pack trains (one of twenty-five days) were made, and two on foot, with the result that thirteen reserves recommended all but two are personally known to members of the Commission. Of these two, one was laid down by the State Engineer of the State where it lies, and in the other the character of the forest was well known from the study of adjacent areas, and the region itself had been thoroughly and repeatedly described to us by the men best able to do so."

THE iron industry in the eastern part of Cuba overshadows all other interests. Two American companies in that vicinity employ 1400 men, and ship to Pennsylvania mills nearly 50,000 tons of ore per month. The ore is very rich. From 1828 to 1840, Cuba also shipped to this country over $3,000,000 worth of copper ore, but this branch of trade has lapsed considerably. American capital was busy in the development of numerous new deposits of manganese ore when the revolution broke out.

"Trinidad, the Gateway."

In the southeastern part of Colorado, a few miles from the New Mexican line, lies Trinidad, the metropolis of that section, and the natural gateway to the La Belle mining district. The illustration of the Mexican adobe and oven might indicate that that was a slow country, but there is nothing slow about the business men of Trinidad or the gold that is now being taken out south of there. From the El Moro coke ovens, illustrated on this page, is annually shipped great quantities of coke through Colorado, New Mexico, Kansas and Nebraska. The coal and iron deposits of that section make manifest its future commercial importance. The La Belle mining district, the oldest gold mining section on the continent, is reached by the Union Pacific, Denver & Gulf Railway, which affords direct communication with the Gulf of Mexico.

Tributary to the La Belle district is the "Red River country," remarkable mainly for the diversity of its ores. Years ago a copper smelter was erected at this point, but was abandoned in the search for silver. Much copper ore was mined in the vicinity, as is shown in the dumps before a number of old mines which were once abandoned, but are now being relocated and opened up. In the walls of this canyon gold veins have been opened, among others, the Franklin Mill and Mining Co., operated profitably. A cut of the flume appears. The ore bodies are deemed of sufficient extent to warrant the erection of a chemical reduction works, which is being backed by a Philadelphia syndicate and will be a modification of the cyanide-chlorination processes.

The Denver & Gulf Railway Co. has done a great deal in the way of developing this district, and is an example of what a live railway corporation can do in making new business, thus helping itself and the country to which it looks for local trade.



FRANKLIN M. & M. CO.'S FLUME, LA BELLE, N. M.



MEXICAN ADOBE AND OVEN.

Railroads Needed.

To the Editor:—We have read your article in the issue of March 13th on muddy roads with much interest. We have had an experience like your correspondent's on the road he speaks of, between Ione and Sutter Creek—only in our case, when told by the driver to get out and walk, we found hardly any earth to walk on. A friend writes us from the interior that he saw twenty wrecks of teams between Chinese Camp and Oakdale, and accounts from about everywhere else agree in declaring that the condition of the roads is simply horrible. It is well, of course, to talk about improving the roads, but we fear that this is a remedy that will not cure, at least in winter. What the mining towns of Sutter Creek, Angels and Sonora need is railroads. It would not take over sixty to eighty miles to connect all these places with civilization, and it is strange that such lines have not been built. The Denver & Rio Grande and Canadian Pacific require no stimulation on this head; and were the camps named or Randsburg in their territory, there would be little complaint as to the difficulty of reaching them in summer or winter. The stage ride from the railways to these towns is a great bar to the investment of capital. People of means like to be able to visit properties with comfort and pleasure, and many a man with money, after having been jolted and knocked about in a rickety stage over a stony or rutty road, has shaken off the dust against a locality in which the torture was inflicted and sworn he would not repeat his experience if the mine he went to see could be had as a gift. With easy access and cheap freights, the mining towns of California would increase tenfold in business, and it is strange that the railroads have not hitherto been able to recognize so ostensible a fact.

"Alpha."

San Francisco, March 23rd, '97.

"Alpha" is right. About a year ago this paper had a series of editorials, giving facts and figures in detail, showing how cheaply narrow gauge roads have been constructed in mountainous regions, and how satisfactorily they operated. Railroads with a much narrower gauge than that between Colfax and Grass Valley are being successfully operated elsewhere, and the matter is worthy of general attention and immediate action.

Ancient Coin Alloys.

Alloys of gold and silver, even if rich in gold, have a silver white color, consequently in ancient times gold was generally present undetected in silver coins. The parting of gold and silver was discovered in the 16th century, but even then it was not found possible to prepare 24 carat gold. Most of the medieval silver coins are rich in gold, containing 0.02 per cent, or even more Stolba has found in old Bohemian silver coins, dating from 1037 to 1120, as much as 0 42 to 0.45 per cent of gold. This is very remarkable, for the Bohemian silver mines then worked yielded silver free from gold. It is probable, therefore, that these old Bohemian silver coins were made out of remelted Arabian ones.

The United States Geological Survey uses a band saw, the invention of the department, for cutting up specimens which come for microscopic examination. It is an endless steel wire, between an eighth and a sixteenth of an inch thick, running at very high speed over two wheels. Water and emery are fed on the wire as it runs.



EL MORO COKE OVENS, TRINIDAD, COLO.

Scientific Progress.

The Origin of Petroleum.

At a recent meeting of the American Philosophical Society, in Philadelphia, papers were read by some of the most eminent oil experts in this country—men who have devoted years to the study of the subject. The subject for the evening was "The Genesis and Chemical Relations of Petroleum and Natural Gas." The discussion was opened by a paper read by Prof. S. P. Sadtler, who was followed by Prof. S. F. Peckham of Ann Arbor, Mich., Prof. David T. Day of Washington and Prof. C. F. Mabery of Cleveland, Ohio. The papers and discussion took a wide range, and the opinions of eminent experts in Europe and America were cited, not only upon the origin but also upon the constituents of petroleum. But little was said about natural gas, which was simply referred to as the same substance in another form. The opinions expressed and cited show that there is no agreement, or anything approximating it, among scientific men as to whether it is a product derived from organic matter, animal or vegetable, or from inorganic matter, or from both. There seemed to be abundant evidence in favor of any of these derivations, and as Prof. Mabery, who spoke principally on the chemical constituents of petroleum, showed that there were very great differences in the oils from the different fields, the conclusion would seem to be warranted that they are derived from both organic and inorganic substances, and also from a combination of them. It is also probable that the processes are as varied as the elements from which they are produced. There is no end of literature upon the subject. One of the earliest writers, Baron von Humboldt, described the petroleum springs on the coast of Venezuela, and believed the oil was distilled from the primitive rocks. A French writer at a somewhat later date connected the rocks with igneous and eruptive agencies. Dr. Sadtler, who gave a recapitulation of the various theories advanced, mentioned as the simplest the emanation theory, that is, it is a cosmic product formed in the crust of the earth by the direct union of hydrogen and carbon. That theory, however, does not find much credit at present. Another theory was that the metallic carbides in the depths of the earth, coming in contact with water filtered from the earth's crust, would produce the necessary conditions.

Among the organic theories the decomposition of peat covered with sand was mentioned. Prof. Peckham spoke of the theory of the production of petroleum from the remains of marine animals. He was not prepared to say that any formula was of universal application. Bitumens in some instances were produced by the decomposition of animal remains in the places where they were originally produced. There were also primary distillations produced by hot steam in past periods. In some instances bitumens had been transferred and stored by hot steam and pressure. Much geological and chemical research would be necessary to determine all the varied processes which have produced the many varieties of petroleum that have been discovered.

Utilizing Wave Power.

For many years past engineers have endeavored to devise a practical plan or apparatus whereby the actual power resulting from the action of waves and tides may be conserved, and the energy either utilized immediately or accumulated and stored for future usage. Granted that an efficient apparatus can be made available, it is obvious that the purposes to which it may be applied are many. In the designing of power generators, even those utilizing the energy of falling water, it is necessary, from a commercial point of view, that their efficiency should approximate with some amount of accuracy to the theoretical value of the source of power. In the designing of wave motors and tide motors, however, this relative efficiency can in some measure be ignored, for the power available is so vast that the successful utilization of even a small fraction of it would create an almost entirely new set of industrial and manufacturing conditions in those districts in which tide and wave power is available. Ultimately, of course, the inventor would strive to perfect his apparatus so that the results bore some close relation to the potential energy. At present, however, as we have said, he is untrammeled by such considerations, and his leading aim is to devise some means of making perhaps the greatest of Nature's powers available for the use of man.—Industries and Iron.

Temperature of Arid Regions.

Willis L. Moore, chief of the United States Weather Bureau, expressed the opinion, in a recent paper on "Some Climatic Features of the Arid Region," that the ideal climate, as regards equality of temperature and absence of moisture, does not exist in the United States. Such a climate, he says, is found only on the plateaus of the tropics, as, for example, at Santa Fe de Bogota, in Colombia, where the average annual temperature is about 59°. The southeastern part of the United States has the nearest approach to this ideal temperature. Even in the Southwest the range of variation is too great, and the rainfall reaches from nothing to a point greater than is to be found in the Eastern or Middle States. Ranges of temperature depend upon the dryness and clearness of the sky. Thus, while the summer temperature of the Southwest is high, the real degree of heat as felt by animal life is not indicated by the common thermometer, but by a mercurial thermometer, the bulb of which is wet at the time of the observation. In this manner is shown the temperature of evaporation, the sensible temperature, and, more nearly than can otherwise be indicated, the actual heat of the body.

The inland valleys and plains east of the Rocky mountain foothills have an average summer temperature of from 65° on the north to 80° on the Gulf coast. While the daytime heat in the arid regions seems excessive, it is not really so, owing to the extreme dryness of the atmosphere. It is, as is well known, the moist, "sticky" heat that is prostrating. Again, in these regions the radiation at night is so great that the temperature is made tolerable, and, indeed, comfortable. Estimated by the temperature of evaporation, the arid region is the coolest part of the country. The falling of temperature from the time of the greatest heat is irregular and not at all dependent upon longitude reckoned west from Greenwich. Mr. Moore cites as an example of this fact that the temperature falls as much by 6 P. M. in Denver as it does by 8 P. M. in New York and Philadelphia. This is accounted for in the greater daily range and more rapid rate of cooling at elevated stations.

ARTIFICIAL LIGHT should be essentially different from sunlight. It is natural for the optic nerve, fatigued by daylight, to be relieved by twilight and darkness, but the use of the eyes can be safely continued for some hours longer if an artificial light, that is soft and as free as possible from actinic rays, be employed. The greenish-blue light of the gas mantles in most common use may prove injurious to the eyesight in the course of time. A pharmaceutical writer adds that the light of acetylene—not yet a safe or economical illuminant—to be remarkably free from actinic rays, as is also the light from paraffine.

A BALTIMORE man said his arm had been broken by a railroad car and demanded $3500 of the company. He was offered $100 and refused it. Then the company thought of the X-ray, which brought out the bones in plain sight, showing that they had never been broken. Then the man offered to take $25, but didn't get a cent.

Electrical Progress.

Electricity in Safe-Breaking.

About three years ago attention was called to the possibility of using an electric current for the purpose of opening so-called burglar proof safes. In investigating the possibilities of using electricity upon an explosive-resisting safe, it appeared that it was not at all a question of possibility—that admitted of no doubt—only one of probability and practicability. Suggestions were made that burglars would soon use the enormous heat of an electric arc for drawing the temper or penetrating the sheets of steel vaults and safes. The opinion expressed has now received verification, for recent experiments have shown an arc of forty to fifty volts, with a current of 300 to 500 amperes, penetrate in three to ten minutes safe walls 3 to 6 inches thick, and as a demonstration of the masses of metal which could be operated upon a rough steel ingot, perhaps 6x7x10 inches, was penetrated with a diagonal jagged hole from 1½ to 3½ inches in diameter, the thickness of metal pierced being about 8 or 9 inches.

What construction can resist this concentration of heat? The hardest steel is penetrated easily, even more easily than the softest iron, while the cast metal used in the heretofore invulnerable safe melts and runs like water, making, from its very nature, an easier safe to open than those built of the rolled metal, which, as is well known, remains plastic under a high degree of heat, and has not the tendency to flow from the arc and leave an entirely unobrtructed passage. In penetrating the wrought iron or mild steel it was frequently necessary to allow the arc to play on the semi-plastic mass being melted, to keep it from congealing and preventing further progress. This took somewhat longer time. The cast safes, owing to the fact that the metal was necessarily designed to flow, in order that the safe could be cast from the pattern, did not resist the arc nearly so long for a given penetration. The metal readily flowed, and a hole large enough to permit the safe to be opened was quickly made; this without noise or aught to give warning.

Electric Tramways in Paris.

The question of increased facilities for local transportation in Paris is being agitated, especially in view of the anticipated requirements for the coming exposition. There has been prepared a scheme by MM. Cauderay and Renard for a system of electric tramways which shall meet all the demands of the situation. Apart from the local features of interest which the plans present, it is worthy of note that the scheme includes the idea of combining both underground and overhead trolleys with the storage system. Each car is to carry a storage battery, which may be charged at any time when in connection with a trolley wire, and the current from the storage battery is to be used to carry the car over that portion of the city in which no wire, either overhead or underground is permitted. Wherever a subterranean conduit is permissible, it is to be constructed, while in the suburbs the overhead wire is contemplated. The practicability of the combination scheme is yet to be determined, but it is possible that in some such method the problem may be solved with justice to all concerned, not only in Paris, but on this side of the Atlantic as well.—Engineering Magazine.

W. E. WILSON, F. R. S., AND G. F. FITZGERALD, F. S. R., have communicated to the Royal Society of England a paper on the observed effects of altering the nature and pressure of the atmosphere surrounding an electric arc light. The authors describe experiments upon the arc light in air, oxygen, hydrogen and carbonic acid gas. It has been found by previous observers that NO_2 is formed when the carbon arc is produced in air; and these experiments prove that, with air and oxygen at high pressures, such large quantities of NO_2 are formed in this way that observations of the radiation at these pressures was impossible. Experiments in the same way with hydrogen showed that in this gas the arc is long and thin, with a red line down the center. Observation of the crater of the carbon in hydrogen at high pressure was impossible, because, in the first place, only a very short arc could be maintained; and, secondly, soot trees and a deposit of graphite carbon all round the margin of the crater at high pressure completely hid it. The experiments in carbonic acid at high pressures were the most satisfactory, but owing to a variety of difficulties it was found impossible to decide with certainty whether the crater itself was hotter or colder at high pressures. A thermodynamic investigation of the conditions of the electric arc in an atmosphere at high pressure indicates that by the theory the temperature of the crater should rise 220° C. for every additional atmosphere of pressure, and that the radiation should be double for an increase of four atmospheres. Such a large increase would have almost certainly been detected by the authors, but nothing of the kind was noticed.—Industries and Iron.

AN electrical engineer, who has just returned from a year and a half trip abroad in the interest of the export department of one of the leading electrical companies, gives his views as to where American manufacturers of electrical goods can increase their export business, and says: "While the manufacturers of electrical machinery in this country have exported goods to a great extent to South America, Japan, and, to some extent, to southern Europe, they have, up to date, almost entirely ignored the vast markets of the northern part of Europe, Denmark, Sweden, Norway, Finland and Russia. These countries, bordering on the Baltic, excepting Norway, have a population of many millions. Electricity is there used to a great extent and for numerous purposes. The machinery is, in most instances, imported either from Germany or England. Our manufacturers have the idea that the cheap European labor bars out American goods. This is wrong. The fact is, we are far ahead in skilled labor and in working machinery and tools, and we surpass many of our competitors. These facts should enable us to compete. We are to-day doing a big export business through English and German houses. American manufacturers should cater either directly or through reliable export houses for export business and not let foreigners derive the benefit of their labor and obtain the profits that should remain at home."

IN designing apparatus for electric heating and cooking it is necessary to consider all the laws of heat—its conduction, insulation, absorption and convection—as well as those of electricity. The question of latent and specific heat must be carefully weighed when designing electric heaters or cookers for special purposes. A pound of water will absorb much more heat in a rise of 100 degrees temperature than will a pound of copper or iron. The electric heating of water is more expensive than the electric heating of iron. The economy of electric heating and cooking depends upon the construction of the apparatus so that the heat is all concentrated upon the special work in hand and for the minimum of time possible to do this work. The heat should not go anywhere else than where used before thoroughly ready to use it.

CHAIR-CAR No. 1432, Santa Fe route, is equipped with a new system of electric light, generated from the car axles. When the train is running the light is taken direct from the dynamo, and when running at less than eight miles an hour the light is taken automatically from the storage battery. This dynamo makes over 4,500,000 revolutions on the round trip between Chicago and Denver.

Mechanical Progress.

A New Method of Dressing Car Wheels, Axles, etc.

The art of dressing the harder kinds of metal, such as iron, in the cold state has within historic periods depended upon the grindstone, and it is not until comparatively recent years that other means have become known which reduce the length of time required by the expenditure of more power, or, in other words, since hand labor has been replaced by machinery.

The working of iron in the cold state by means of machinery to cut or dress it has largely supplemented the art of working hot iron for more than a century, and has been the only known means except the grindstone for dressing and finishing iron and its various alloys until late years. The greatest departure from the work of the grindstone was probably made by the introduction of the emery wheel, which differs from the grindstone in being revolved very rapidly, and therefore in doing more work in the same time, thereby replacing time by power; but, on the other hand, it is like the grindstone, in that it loses much more of its own substance than it removes from the material operated upon. A further advance was made in the art by the introduction of the blind saw for cross cutting bars of iron or steel, such as rails, etc., in the cold state. In its operation, the most notable feature is, that less of the operating material is displaced than is removed from the material operated upon, even though the latter is the harder substance. This may be looked upon as being, until recently, the latest form of the attempt to substitute power for time in the manipulation of cold iron or steel.

What appears to be a further distinct advance, inasmuch as the effect is not only to remove more metal in a given time, but also to leave the surface so dressed in more perfect state than heretofore for the work they are intended to perform, is accomplished by the Sibbald machine and process which was primarily intended for dressing journals and other forms of finished work.

A description of the machine may be given as follows. A ring about 33 inches diameter of mild steel (of about 0.65 per cent carbon) is fixed like the tire of a locomotive driving wheel on a suitable center, which is mounted on a heavy shaft, and has its perphery turned to produce the proper profile on the wheel to be operated upon, and very carefully balanced. The disc thus formed is driven at a speed of about 3000 revolutions per minute. The wheel is set in a suitable carrier and is revolved slowly, about two or three revolutions per minute, so that the surface when brought against the operating disc will move in an opposite direction. The wheel and disc are then pressed together with a force sufficient to cause friction enough to consume a great part of the power which is driving the disc, and thus convert the power into heat. The disc cuts or rubs off the metal of the wheel operated upon, and leaves a smooth finished surface, which by the pressure and heat is closed and hardened to a considerable degree and to a depth of 0.01 of an inch or more, depending on the grade of the steel worked upon.

The principal constructive feature in the machine itself is the manner in which the friction on the journals of the disc, which would result from the combined great pressure and high speed, is overcome by a system of forced lubrication, carried out by pumping oil into the bearings at the point of contact, thus causing the shaft to revolve upon a film of oil which flows out at the ends where it is collected by centrifugal force and returned to the pumps.

COMMISSIONER OF PATENTS SEYMOUR has issued an account of the country's industrial progress, and gives a summary of inventing devices in use. In 1866 there were 6616 patents taken out, in 1895 22,057. Electricity has produced 18,700 patents, bicycles 2621, elevators 1736.

A Delicate Instrument.

One of the most exquisitely sensitive instruments ever devised has just been set up by G. Henning of New York, known as the mirror-testing apparatus, designed to test and register the expansion or stretching of metals under heat or strain. It is capable of measuring the strain caused by the footfall of a pedestrian crossing the Brooklyn bridge.

This instrument is simple, its chief part consisting of little mirrors carried on spindles, which in turn, are fastened to a pair of knife edges, so that the slightest change in the position of the knife edge causes a deflection of the mirrors. For the rest there is an ordinary reading telescope, to which is attached a finely graduated scale, reading down to 1-100,000th of an inch. When the knife edges are lightly clamped against the object to be tested, say a bar of steel, and the latter be stretched or expanded, the knife edge will change position, the mirror will be deflected, and as the latter is looked at through the telescope from a distance of 5 or 10 feet, the graduated scale which the mirror reflects seems to move up and down. By watching these movements the stress on the bar is easily calculated. An instrument so sensitive as this, and dealing with graduations of 1-100,000th part of an inch, will register the most minute changes of temperature. The mere proximity of the body will, by the expansion due to the heat radiated therefrom, introduce errors, and the utmost precaution must be taken that the temperature of the room in which the observations are to be made does not vary while they are in progress. Moreover, nervous or excitable persons cannot use such delicate micrometers at all, and even for others considerable experience is necessary before one can become expert in their use and their delicate readings be of practical value.

A. R. BENNETT has devised a little heat engine of greater sensitiveness than the radiometer of Crookes. The motor begins to revolve the moment it is exposed to daylight in the open air, whether the sun is shining or not, the action being due to convection current set up by the slight heating of the metal surfaces and consequent expansion of the air thereon while the glass shade covering the working part is not heated and condenses the air. In one modification, surplus heat is automatically stored by day for use at night, such a motor having continued to rotate throughout three favorable months without stopping day or night. The instrument varies in speed with barometric pressure and moisture of the air, is capable of making the dew point, and can be used as a calorimeter by cooling it to the temperature at which rotation ceases, and then suspending pieces of heated metal inside. In this way the specific heats of substances can be accurately compared, the number of rotations caused being in direct proportion to the amount of introduced heat. The instrument also promises to be of service in measuring the comparative heat-retaining power of textile fabrics, boiler compositions, etc., and the relative heat conductivities of thin threads and wires, while it is now being employed in a series of interesting tests of the comparative sensitiveness to convection effects of various gases.

OIL-FED TWIST DRILLS are among the latest tool novelties put on the market. As described in Cassier's they are provided with small tubes passing down the body of the tool from shank to point. Oil is forced into these at the shank end, and by its escape at the bottom of the hole being drilled it lubricates the cutting edges of the drill far more effectively than is possible by the older method of squirting oil into the hole from a can. A minor advantage claimed for the tool is that the oil, as it flows outward through the hole, assists in the removal of the chips. Drills of this kind, like the lubricated milling cutters, should give good accounts of themselves.

THE "self-regulating wave motor" has again been "brought to a state of perfection," this time by Parvin Wright of Los Angeles, Cal.

Practical Information.

Hard to Figure Out a Rule.

The State Department has completed the work of collecting and publishing a complete set of reports by United States ambassadors, ministers and consular officers abroad, exhibiting in concise form the financial systems of all of the countries of the civilized world, with full explanatory notes by the officials of the effects of the different kinds of money used as standards of value upon the industrial population of the respective nations.

Nineteen nations are treated in this last volume, and from a summary of the conditions in these countries the following facts are extracted:

Argentine Republic uses inconvertible paper as a standard of value, though the mints are open to gold. In the last 10 years prices have advanced as measured in this standard, and wages as well.

The British Australian colonies with the gold standard show a mixed result. Prices of agricultural products advanced in the decade in New Zealand, while they declined in Victoria; wages declined in the first case and remained stationary and high in the latter.

In Bolivia, with a single silver standard, though there was no data on the effect of wages, it appeared that food supplies, except for imported articles, were cheap, while clothing, house rents, drugs, and hardware were high.

From Brazil, with a nominal gold standard, but no actual coinage, data is wanting.

Cape Colony has the single gold standard, though without mintage. There the wages have increased 15 per cent in the decade and there has been an increase in the cost of living, with heavy fluctuations in the export commodities.

In China, without any legal standard, silver weighed for large transactions and copper for small sales, are used in business. There has been an increase in the silver price of imports; no difference in the price of Chinese products, and wages show no change, though new avenues for employment have been opened up in manufacturing.

Denmark, with the single gold standard, shows an increase of 10 per cent in wages since 1884.

India, with a silver standard, though with mints closed except to the government, shows an increase in the prices of some articles and a decline in others; wages show the same variation. The increase in prices is in raw exports, and in imports, except tea, and the decrease in tea and sugar.

Japan, with a silver standard, shows a general advance in prices and in wages as well. There was a decline in prices between 1884 and 1887 attributed to the curtailment of paper money and a general advance from the latter date up to 1895. The increase is said to be due to a scarcity in the crop. The Japanese Consul says that he is authorized by his Government to state that notwithstanding the recent adoption by Japan of a gold standard of currency, she will continue the use of silver and that all silver now in the possession of his Government will be coined into subsidiary coins.

Persia has a silver standard and in that country wages and prices both advanced in the past 10 years. The currency is, however, greatly depreciated and the country is much poorer than it was 23 years ago.

Peru uses silver only and prices increased as measured in that standard, while Portugal, with a gold standard, showed a 25 per cent increase attributable to the fact that the actual money in use is paper.

Salvador is now using silver, but steps have been taken to substitute gold. Meanwhile prices were advanced in a marked degree, owing, it is said, to depreciated currency. The only labor in Salvador is employed on farms and wages in that case were advanced slightly.

Gold is the standard in Sierra Leone and prices generally declined, owing, it is said, to overtrading and the falling off in exports to Europe.

In the South African republic, with a gold standard high prices obtained for domestic goods. Imported articles are said to be "reasonable" and wages are high in the skilled trades, mining, and building.

Spain uses a double standard, gold and silver: prices have generally advanced and only expert labor has advanced its wages.

The high prices are attributed to the fact that Spain is constantly importing a large quantity of the necessaries of life and because of the premium she must pay on them; prices of living are 12 to 20 per cent higher than if the currency were at par.

The gold standard in Sweden was accompanied by declining prices, but advancing wages, while Venezuela, with the double standard, though with closed mints, showed a mixed result; wages stationary and prices advancing in some articles and declining in others.

Bacteria.

Zoologists and botanists alike laid claim to the bacteria until comparatively recent years, but the zoologists were forced to yield to their botanical brethren, and the curious little organisms popularly known as "microbes" are now classified, almost without question, among the simplest of the plant forms, and as near relatives of the algæ. The most common form of bacteria is rod-shaped, though others are spiral, spherical and egg-shaped. In size they vary considerably. Some of the larger forms are $\frac{20}{25000}$ of an inch in length, while one of the smallest is about $\frac{}{500000}$ of an inch. To give a rather more definite idea of the minuteness of some of these organisms, imagine 1500 placed end to end, hardly reaching across a pin head. Extremely powerful lenses must consequently be brought to bear upon them before they will yield up the secret of their life history and workings; and, as the little bodies are almost transparent, the microscopist is obliged to stain them with some dye to render them anything but shadowy and indistinct. Some, however, massed together in large quantities, make a most brilliant showing. The phosphorescent lights seen in many bodies of water and on decaying wood or vegetables are produced by immense numbers of massed bacteria. Other kinds have a blue or greenish tinge, and one of the most striking of all is scarlet in color, the little cells collected in large quantities on certain moist organic substances having the appearance of blood drops.

What Is a Gallon?

In the issue of Feb. 27th editorial reference was made to a bill introduced in the California Legislature regarding a "miner's inch," which raised the question: "What is a gallon?" That comes up as a matter of some moment in an interesting and curious suit brought by a Chicago paint firm against the National Linseed Oil Company, to recover the value of alleged short deliveries of oil. That particular case hinges on this point: The United States standard gallon contains 231 cubic inches. This amount of water at 60° Fahrenheit, the accepted temperature, weighs 8¾ pounds. Raw linseed oil, consequently, with a specific gravity of 932, should weigh 7.766 pounds. It has become the custom in commercial transactions to consider 7½ pounds the weight of a gallon of the oil, which is really more than a quarter of a pound less than the actual weight at the standard temperature. The suit is to recover this difference in purchases extending over a long period, estimated at a money value of $25,000.

Mining Summary.

CALIFORNIA.

Amador.

Ledger: In Volcano district work was resumed some time ago by J. W. Lyle on the Fogus property.

The McVay mine, which is located in Clapboard gulch, has been equipped with a roller mill and is now crushing ore.

W. F. Detert, the superintendent, states that the repair work at the Zeila cannot be finished before May 1st, and perhaps not until a later date.

E. M. Allen et al. have sold the Moore mine to William Fleming of Chicago.

The hauling of ore from the Argonaut to the Zeila mill yet continues. The Zeila mill is now running on the second 500-ton test crushing. The managers of the Argonaut are grading the foundation for a 40-stamp mill which they contemplate erecting as soon as the weather will permit.

At the American mine on Sutter creek the new stamp mill was started up last week by Wilfred Dennis. In the bottom of the 70-foot shaft the vein is 8 feet wide.

The California mine at Drytown has been contracted to the Pocahontas Improvement Co. for the sum of $33,400. This property was owned by Mrs. E. A. Miller, John L. Richards, William F. Richards, P. K. Hinkson, Frances Cox and Mrs. Hattie Platt of Sacramento county and Charles J. Richards of Placer county.

Dispatch: On the Alma the shaft is down 1000 feet and they are crosscutting to the ledge, making stopes, sump, etc.

The shaft at the Good Hope mine is now down over 100 feet and sinking is steadily progressing. They are going down on the ledge and are taking out quartz all the time.

Republican: At the Amador Queen No. 1 they are putting up more powerful hoisting gear. The shaft is down over 500 feet. It is the intention to go down to the depth of 1000 feet.

A rich strike occurred a few days ago in the Valparaiso mine at the head of Murphy's gulch. The strike was in the north extension of the old Mammoth mine, three miles south of Jackson.

J. F. Parks, superintendent of the Kendy, has been negotiating recently for the purpose of securing a bond for four years on the Good Hope mine. Seventy-five thousand dollars is to be the purchase price, if the company at the expiration of the term concludes to take the mine.

Butte.

Mercury: At the Diamond mine the shaft is sunk to the depth of 175 feet with good prospects. There is a force of eight men at work.

Register: At the Maack mine, in Morris ravine, the pay gravel it is reported will average $25 a day to the man. In order to work the mine to advantage the tunnels must be cut down lower and this will oblige the owners to put eight or ten men to work.

At the Mt. Ida mine the tunnel is now in 175 feet, the shaft was down 80 feet, and the drift from the bottom of the shaft is 60 feet. The rock looks well but owing to the stormy weather during February and early in this month the mill was closed and will not be run again for three or four weeks.

Calaveras.

At the South Paloma mine under the management of Mark B. Kerr, the shaft has reached a depth of 460 feet and a contract has been let to sink to 600 feet, when crosscuting will be made to the ledge.

At the Prussian Hill mine they have run a tunnel and tapped the ledge at about 170 feet from the surface. It shows about two feet in thickness, and the quartz is of very satisfactory appearance.

At the Gwinn the main work is being done on the 1300 and 1400-foot levels, and ore is being taken out fast enough to keep the 40-stamp mill running night and day. About 115 tons is crushed every day, and the owners are well satisfied with the results.

Citizen: At the San Andreas mine, adjoining the Ford, in charge of W. J. Provard, an incline shaft is being sunk and crosscutting east and west will be commenced when considerable depth has been reached.

Chronicle: At the Infernal mine the drain tunnel to tap the water in the mine has now reached a distance of 80 feet and the distance to be run is 250 feet.

The Luddy mine, about 1000 feet from the power plant on the bank of the Mokelumne river was located some six years ago by Mr. Luddy of San Andreas, and C. Kelton of Big Bar Bridge, who at that time ran a tunnel in on the ledge 125 feet and took out some good ore. The mine remained idle until last year when it was bonded to S. H. Lucas, who has been developing the property. They are now in good pay ore and have a ledge 8 feet wide.

Prospect: The Ford Mining Company, incorporated March 30, 1896, reports the following work done:

Shaft sunk since incorporation 260 feet; crosscuts and drifts run during the year on the 300-foot and 400-foot levels amount to a total of 769 feet. Summary of ore bodies: In old shaft about 60 feet in width of low-grade, highly mineralized ore; in new or north shaft, low-grade ore encountered in the shaft from 100 feet to 350 feet in depth. At 100-foot level high-grade ore was found in limited quantities. At 180-foot level exists an ore body 65 feet in width of the same general character as that in the old shaft. At 300-foot level two ore bodies exist, one 30 feet in width and the other 15 feet in width. In the 400-foot level small deposits of quartz and ore were cut near the shaft and an ore body of 20 feet in width was cut at a distance of 100 feet from the shaft. The ore in the 300 and 400-foot levels is of the same general character, carrying free gold and gold-bearing sulphurets. It may properly be termed a low-grade milling ore. Assays have been made of portions of these ore bodies by different assayers, with results ranging from $8.50 to $30.00 per ton.

El Dorado.

(Special Correspondence.)—M. T. Davis, dwelling near Mud Springs, last week turned up four handsome quartz specimens while following his plowshare. They are literally covered with gold on all sides.

Development work is contemplated on the Boneset property in the Jayhawk district, twelve miles west of Placerville. A tunnel was run on this property some years ago. It is now proposed to crosscut the ledge.

In the Big Sandy near Kelsey, a new ore body of good average size and quality was struck last week at 250 feet depth.

At the Pine Hill, nine miles west of town, they are crosscutting on the 200 level. They are drifting to the northwest and when the footwall is reached sinking will be resumed to an additional depth of 200 feet. The ledge matter is 92 feet between the greenstone wall and the dyke. A mill test for 68 feet down yielded $6 in free gold and from $75 to $250 in sulphurets. Steam power and compressed air for drills are in use. The shaft and drift work completed to date is 1352 feet. The property is 2000x6500 feet in area.

Chas. Neilly, et al., of San Francisco, have purchased the Perry ranch, 160 acres, in the vicinity of the Grand Victory mine, six miles southeast of Placerville. They will incorporate and begin extensive development work within a few months.

The Starlight, mine eight miles west of town, has struck a new ore body of good quality on the 250 level. This property is equipped with a new 10-stamp mill and a rope tramway. Steam power is in use.

Pennsylvania people are backing an enterprise in reopening the French Hill property and putting the 10-stamp mill in repair at Spanish Dry Diggings six miles north of Greenwood.

Placerville, March 23d, '97.

Mendocino.

The Red Mountain Mining Company has bonded its property, eight miles southeast of Ukiah, for $10,000.

Mariposa.

Gazette: Work on the Roma mine, on Bear creek, is progressing rapidly, with eight men at work. This is an old mine and was worked in early days on a large scale.

C. G. Rogers, superintendent of the King Solomon and the Last Rose of Summer mines, extensions of the Roma, has eight men at work sinking and drifting.

M. McDougal is opening up the North Star mine with six men sinking a shaft. They are down 60 feet and the vein is 4 feet in width and prospects well from wall to wall.

J. A. Schroeder, superintendent of the Schroeder mine, now owned by F. W. Keeney of San Francisco, has a crew of men at work piping and taking out rock for the new mill which is waiting to be transported to the mine as soon as the roads permit.

Mono.

Best & Smith, owners of the Molus mine, have taken out considerable ore. The property is situated near the old Piute mine across the Mono line in the White mountains.

Nevada.

Transcript: John McCarthy has sold his group of mines in Washington township. The sale includes a water right of 400 inches of water and a ditch eight miles long, and includes the ground and claims from the Honest Frank and El Capitan to Poorman's creek below the Spanish mine.

Epstein & Bandman, of San Francisco, have inspected the Pittsburg mine. They found the property in satisfactory shape. It is believed that a plan is on foot to resume regular operations at this once very productive mine which has for years been worked in a desultory sort of way.

Telegraph: At the Bullion mine the shaft is now down to a depth of 800 feet and they have commenced a drift in order to strike the ledge. The drift will be started from the 800 depth and it is expected that by running south about 30 feet the ledge will be encountered.

Placer.

Argus: J. H. McCloud, of Clipper Gap, has bonded his big lead mine at Rich Flat to Joel Smith for $20,000, the life of the bond being 18 months.

The managers of the Marguerite mine are raising a shaft from a drift to the surface. When this is completed they intend to sink to the depth of 1000 feet. Hoisting works will be erected.

Sentinel: The big tunnel at the Eureka Consolidated drift gravel mine, above Forest Hill, was in a distance of 1932 feet on the date of March 12. The rock is very soft, and gives evidence that the channel must be near at hand. An upraise will soon be made. The company owns 6½ miles of established channel on the divide that has so far produced over $30,000,000.

San Bernardino.

On the Columbia mine, in the Macedonia district, one shaft is down 75 feet and another 30 feet is being sunk, also a crosscut tunnel 140 feet long. This tunnel taps the ledge about 100 feet deep. Two hundred tons of second-class ore is on the dump and ten tons of first-class ore.

The Occidental, Golden West and Good Hope are showing good ore.

H. U. Mudge is developing a group of five claims in the 29 Palms district. A 10-stamp mill will probably be put in in the spring.

Times: The Rose mine is putting on a large force of men and is sinking from the 700-foot level. Their 10-stamp mill is running night and day, besides shipping considerable high-grade ore.

The old Jeff Davis mine in the Morongo district has been purchased by San Francisco capitalists, represented on the grounds by G. L. Brown and M. E. and W. Barclay, the latter being superintendent. They have put ten men at work. The deepest shaft is down 120 feet. They have also purchased the Old Woman spring and two or three claims from J. Doyle and expect to put in a mill at the spring at an early date. They have also bonded a group of mines ten miles from Victor to be worked by a company called the Lafayette Gold Company.

E. McFee has run a tunnel on a well-defined ledge in Blackhawk mountain, showing a fine ledge of a large body of medium-grade gold ore.

San Diego.

Union: Twenty men are at work on the Aurora mine at Alamo under the direction of F. M. Bradshaw, one of the owners. The Aurora, before a granite dike was encountered a few years ago, produced $400,000 for its owners, Russell & Rhodes of Los Angeles.

The new management at the old copper mine, four miles south of San Marcos, has sunk a shaft and got a new ledge which is not only richer in copper than the old one but bears considerable silver.

Shasta.

Searchlight: The Mountain Copper Company is rapidly increasing its smelting capacity, and in a few weeks the third smelter will be ready to charge. The second furnace has been receiving ore for some time, and the capacity of the ovens and surface kilns has been taxed to the utmost. The new surface kilns on the bluff opposite the smelter are now being charged; with these the output will be nearly trebled. The roasted or calcined ore will be carried to the smelters by means of a wire ropeway, now about completed, and a great saving will result over the old system of reloading into cars and hauling the ore to its final destination.

Holt & Gregg have a large force of men employed at their lime quarries, near Kennett, building several large kilns. The firm will burn 2600 barrels during the present year.

M. D. Butler of the Delta mine, on Dog creek, will develop a cinnabar property in Trinity county. The Delta mine has been bonded by E. Sanders et al., and pumping machinery is being put into the mine to develop to a greater depth.

Barner & Riebe and Richard Hetschel, owners of the Gambrinus mine, located near Whiskeytown, struck a foot vein of rich rock on that property last week. Another tunnel will be started to tap the ledge 100 feet lower.

Dale & Dawson, proprietors of the Star of Hope mine, on Clover creek, shipped a carload of ore to the Keswick smelter last week. Their property has paid for its own development up to date.

Considerable interest has been aroused on account of the finding of good placer ground on the McCloud and some of its tributaries. J. B. Campbell has a claim ten miles above Baird that has produced considerable value. Last week he found a $36 nugget, and, from appearances, he is working on an old channel. Quartz gold is also found in the gulches tributary to the McCloud.

Free Press: At the Princess hydraulic mine, near Horsetown, after an experimental run of seventeen days with one giant, a good clean-up was made, and it will now be a month before the next. The giants are running night and day. Eight men are now employed.

At Old Diggings, the Central mine, owned by Whitehouse & Bliss of New York, and under the management of Mr. Hart, is turning out to be an excellent property. A railroad or tramway has been built from the mine to the Sacramento river, where the ore will be dumped and transported across the river and taken to the smelter at Keswick.

Litsch & Panter are hauling rich ore from the Garfield mine, which is also put across the river by a ropeway.

The Spanish mine, owned by Joshua Henry, is being developed, as also the Reid mine, which is under the foremanship of William Sandry.

Sierra.

Enterprise: Forty feet were made last week in the north tunnel at the Extension, with the rock in the face still soft.

Siskiyou.

Reporter: On Scott Bar twenty men are employed on the Columbia mine.

News: The Deistlehorst dredger is operating day and night in the Klamath. One advantage of this kind of mining is the ability to run in all kinds of weather, or in high or low water. The results of the enterprise have heretofore been entirely satisfactory, and more machines will be put in during the coming summer.

Work at the Blue Gravel has been progressing steadily during the past week. They have drifted a distance of 32 feet from the shaft on bedrock, which is pitched 2 feet.

On Humbug the Bull Brothers are working their hydraulic claim with good success. Colstein & Thrasn are taking out ore from their quartz mine and doing development work.

There have been some important developments in quartz properties during the past week in the Salmon river and Quartz valley localities, and reports of two rich strikes have been received.

Trinity.

Free Press: The furnaces at the Altoona quicksilver mine at Cinnabar will soon close down for a short time pending the further development of the mine. In the lower level at a depth of 350 feet the ledge pitched off from the shaft. During the winter months the shaft was put down to 500 feet and a drift was run to crosscut the ledge at that depth. The ore body was struck and looked exceedingly well. The air in the drift was bad and work upon an upraise on the ledge from the drift to the lower level has been in progress for some time in hopes of improving the ventilation. The work is not yet completed and the furnaces will be closed until the work is done. The mine is very wet. A 12-inch stream of water flows continuously from the pumps. The property never looked more valuable than at present.

Operations at the Bloss & McCleary hydraulic mine are progressing favorably. The firm has recently been operating extensively on the Hoskins mine, which they have had under bond for some time. They have completed the 60-foot shaft to the bed-rock and last week began drifting from the bottom.

Tuolumne.

Democratic Banner: The Toledo mine, near Tuttletown, has been bonded by San Francisco parties.

A well-defined ore chute has been developed in the Butler mine, Big Oak Flat, and hoisting machinery is being erected.

The Monogram has been developed sufficiently to justify the erection of a 10-stamp mill, which will be done at once.

John James has sold the Two Brothers mine, at Groveland, to parties in San Francisco. They expect to start to work as soon as they can land the necessary machinery.

Union Democrat: At the Dutch the drift is still being carried along through the rich body of ore struck last week, but its true extent has not yet been proven. Work is also continuing on the 200 level.

The Table Mountain gravel mine is being worked at present with a small crew, which will be increased by the owners, J. Hoskin & Co., when summer opens. One hundred and fifty feet of the old tunnel has been cleaned up, from which point they are drifting both ways on a body of pay gravel of some 60 feet in width.

At the Santa Ysabel sinking has been resumed in shaft No. 3 from the 600 level. They have commenced upraising onto Mascot vein to get the ledge blocked out for crushing when the new mill is in running order. Millwrights have commenced work on the new 20-stamp mill, but progress is slow on account of lumber and material arriving slowly. The machinery has all been forwarded and is tied up at Oakdale.

The Alabama is confining operations to sinking the shaft another 100 feet. When the neceesary depth is reached working on a large scale will be commenced under Superintendent W. E. Nevills.

Independent: Dr. Redding has struck a very rich vein of ore on his Tarantula mine. The quartz is intermixed with dyke and the vein from which it is taken is undoubtedly the Toledo.

NEVADA.

Walker Lake *Bulletin*: At Silver Peak in the Chiatovich tunnel there has been struck a large body of good ore in the Mary ledge, which the tunnel taps at a depth of about 450 feet. This proves the permanency of the mines.

L. Leidy is still developing his mine and has some good ore.

Barnes and partners of Alida Valley are taking out rich ore for shipment when the roads open.

Vickery & Scott are running a tunnel to drain their mine and are nearly in to the ledge.

A Los Angeles company has purchased and located a large lot of placer ground near Little Log spring, at the head of Tule canyon, and intend to work as soon as the snow gets off.

A copper deposit has been discovered in Salene valley.

Dayton *Times*: The enlargements to the Douglass mill for the machines of the Peck plant are approaching completion.

The Davis leaching plant is completed with the exception of setting up the tanks, which are expected to arrive soon.

WASHINGTON.

Spokane *Chronicle*: A Cheney syndicate has acquired the First National, Anna V. and Ruby, seven miles from Chewelah. Men are doing development work.

IDAHO.

F. F. Church, superintendent of the Boise assay office, has completed the compilation of the figures of gold, silver and lead during the year 1896. These figures show a total of $11,751,845, an increase of $1,641,360 over 1895. The following is a summary of the production:

	1896.	*1895.*
Gold	$ 2,323,700	$ 2,594,666
Silver	6,474,765	5,214,498
Lead	2,953,380	2,301,321
Tstals	$11,751,845	$10,110,485

Owyhee county leads in the production of gold, while Shoshone county shows the largest production of silver and lead.

Near Pierce City the American Placer Mining Company will start three giants before long. This company finished a three-mile bedrock flume last fall at a cost of $25,000, by which they will be able to handle the gravel in the Oro Fino bottom for a distance of twelve miles, which has never been worked for lack of dump. The flume empties into the canyon down which the Oro Fino rushes to the Clearwater, descending 2000 feet in fifteen miles. A short run was made with one giant last fall before cold weather came, the clean-up showing $1.50 per yard. The company owns some 1500 acres that it is their intention to wash off eventually, with an average depth of two yards, but the amount of water for use is small.

The Montana mine, located in Custer county, has been sold to Spokane and New York parties for $40,000.

Near Ketchum the Florida Mountain Mining Company has discharged all its miners except half a dozen employed running the drift in the lower level. In consequence, the new

and well-equipped mill at Dewey has ceased to drop stamps. The ore was of such low grade that it has not been paying hauling and milling expenses. About seventy-five men have been laid off.

BRITISH COLUMBIA

The following annual statement of the Slocan Star mine for 1896 will give an idea of costs of working and other disadvantages in that direction overcome by the richness of the ore. It will be seen that the duty paid exceeds the cost of all machinery, flumes and other improvements.

RECEIPTS

Cash on hand January 1, 1896		$ 19,402 69
Sales of ore	$645,814 35	
Rents etc	1,091 93	
Sales of material and supplies	336 53	
Refund of overcharges	451 50	
Damage to flume	38 50	651,635.81
Total		$701,008 50

EXPENDITURES

Labor	$ 86,117 11	
Supplies	19,348 21	
General expenses	2,096 25	
Equipment	26,563 16	
Freight and treatment	181,359 12	
Duty	75,459 63	
Counsel fees, insurance, etc	3,121 10	$394,001.07
Purchase of mineral claims		300 00
Dividends		250,000 00
Cash on hand December 31, 1896		56,793.53
Total		$701,008.50

Receipts from sales of silver and lead year ending December 31, 1896—

584,301 16 ounces of silver	$393,302 10
Average price of silver per ounce, .6731	
8,946,398 pounds of lead	$252,512.25
Average price of lead per cwt., $2 82¼	
Total	$645,814.35

SHIPMENTS FOR 1896.

	Pounds.
Gross weight of ore reported from smelters	15,597,097
Less tare weight of sacks	164,160
Less tare moisture	222,133
Net weight of ore reported from smelters	15,210,774

Average assay of year's shipments 7,865.0774 net tons; silver, 80.875 ounces per ton; lead, 63.35 per cent; moisture, 1.11 per cent.

Total production of silver and lead—

Gross ounces of silver reported from smelters	615,053.75
Less smelter deductions, 5 per cent.	30,752.69
Net ounces of silver reported from smelters	584,301 06
Gross pounds of lead reported from smelters	9,940,442
Less smelter deductions, 10 per cent	994,044
Net pounds of lead reported from smelters	8,946,398

There has been expended during the life of the mine $71,376 in machinery, flumes and other improvements.

Spokane *Chronicle*: C. L. Hoffman has bought the Cultus mineral claim for $4000.

The Slocan Star will declare another dividend of $50,000 next month, making a total of $450,000 paid in dividends by this mine.

F. LeCasto has bonded the Slocan Chief No. 10 and the Kootenay Queen at Kaslo creek for $30,000, 10 per cent down.

The Mountain View on Granite mountain, near Silverton, has been bonded by New Denver parties to John McMartin for $20,000.

Webb and Hughes, owners of the Montezuma mine, on the south fork of Kaslo creek, are making final arrangements to build a 100-ton concentrator.

The ore now in the bottom of Le Roi's shaft, below the 500-foot level, and in the face of the new west drift on that level, is of a very high grade. That in the west drift assays higher in gold than any yet taken from the mine. Ten assays taken from the ore in the bottom of the shaft gave an average of $58.96 per ton, while five assays made from the face of the west drift gave an average of $136 per ton.

UTAH.

Tintic *Miner*: Centennial-Eureka mine made another ore strike during the last week, which, promises to guarantee the continuance of regular dividends. The new ore body is over 8 feet wide, and an average sample across the entire face shows values of 79 ounces silver $8 in gold.

The shipments for the week were as follows: From the Bullion-Beck mine, twenty-five carloads of ore; Bullion-Beck mill, ten carloads of concentrates; Eureka Hill mine and mill, five carloads of concentrates; Ajax, five carloads of ore; Mammoth mill, eight carloads of concentrates; Sioux mill, six carloads of concentrates; Buckeye, one carload of ore; Dragon iron mine, two carloads of ore daily; Noon's iron mine, one carload of ore daily.

Eureka *Democrat*: Work will be resumed on the Buda claim near the Buckeye at Silver City. The shaft is now down 62 feet, and an incline drift has been run for a distance of 106 feet.

The timbers have arrived for the Godiva shaft and foundation for the compressor, and are being put in place.

Mammoth *Record*: All but three of the workmen at the Sunbeam have been laid off. The flow of water which was encountered a few days ago will probably necessitate the putting in of a pumping plant if the company decides to continue active development.

Work has been suspended on the Primrose at Silver City, the shaft having been sunk to the depth of 200 feet.

Bingham *Bulletin*: The Nast group has passed from the control of the Bingham Copper Company, which was operating it under bond and lease, and reverted to the owners.

The Bingham Copper Company is placing an order for a hoist at the Starlus, which will be planted over the shaft at the tunnel level, which is now 170 feet in depth.

Tribune: Since January 1st the Ontario has shipped 165,066 fine ounces of silver, and the Daly 115,936. The figures represent the product up to and including March 10th.

The auriferous deposits of the extreme West Dip are to be put to a test and to that end Capt. J. R. De Lamar will put down a shaft to whatever depth may be necessary to accomplish it.

In the Sunshine the workings have reached a depth of about 1000 feet, the arsenical properties have almost entirely disappeared, and it is claimed that there is a better quality of ore in sight than has yet been encountered in the mine. All the while the mill hasbeen closed down experiments looking to an increased saving of values have been in progress.

The Sacramento will very likely begin the payment of dividends again in April.

T. M. Thomas, who is identified with the gilsonite deposits of the Uncompahgre reservation, says the intention is to begin work on the locations as soon as an order can be secured from the officials at Washington.

The Dalton & Lark is producing only such ore as is necessary to provide for expenses, and no effort will be made to increase the output until the matting plant is erected.

President W. H. Thomas has gone to Bingham to outline plans for the future development of the Niagara Company's property. At present the ground is being worked almost exclusively by lessees, the management having found that the most profitable method. That the low-grade gold ores of Bingham can be profitably mined was revealed first, perhaps, by the management of the Niagara. Col. Heffron, who was in charge at the time, ascertained that on the surface were ores running from $4 to $7 per ton, and to the end that they might be handled, experiments were begun. Before the expiration of the season it was demonstrated that the gold ores could be treated at a fair profit.

SOUTH DAKOTA.

Black Hills *Times*: A. B. Wells of Fort Meade has closed a deal on the Canada group of twenty-two claims, lying north of the Highland group on Iron creek.

Hartzell, Hennelley, Murphy & Rankins, the owners of a group in the Ragged Top country, have disposed of ten claims in the Foutz group to Mason, Stewart and other Elkhorn railroad officials for $10,000.

Development work on the Snowstorm property in Nevada gulch has been suspended, but will be resumed by the first of May. The Eastern parties represented by Merrill & Allen have sunk a shaft 360 feet to quartzite and driven tunnels aggregating 425 feet, without finding ore that would justify handling. They have expended about $30,000.

Kilpatrick Bros. & Dacey are working double shifts in the shaft on the Flora E., on Ragged Top, which is now about 280 feet in depth. The company has contemplated for some time putting in a new hoisting plant over the Dacey shaft, though the matter has not as yet been decided upon.

The new hydraulic company at Hayward will put a dam across Battle creek and put in an extensive pumping plant which will lift the water to the divide between Battle creek and Rosebud, where the reservoir will give a sufficient head of water for hydraulic purposes.

The Union Hill Company's last shipment of ore from the Richmond-Sitting Bull property gave returns of 107 ounces silver, 16 per cent lead and $20 gold per ton. A large force of men are employed and there is more ore and of better grade in sight than at any time since the mine was first opened. A fine grade of iron fluxing ore is being mined from the Custer lode, one of the Richmond group of claims. The company are also taking out a good grade of ore from the Black Prince group. At the Branch Mint lode the vein of ore is steadily increasing in size. The diamond drill on Union Hill proper has reached a depth of 620 feet. The core brought up shows the ore body to be continuous and of average grade. Assays show values ranging from $7.32 to $33 gold per ton. The ore is a free milling proposition, and with the big mill and automatic appliances to be put up this season by the company the cost of milling and mining this ore will not exceed $1 per ton.

A discovery of siliceous ore identical with that from Ragged Top has been made in the limestone range southwest of Custer peak by W. M. Merritt. The ore is found in the limestone, following a porphyry contact, and exists in vertical and horizontal veins that are easily traced for a distance of 6000 feet.

WYOMING.

An option has been given to New York capitalists by the owners of the group of iron mines at Hartsville, from which shipments of iron ore have been made for the past two months to Denver smelters. The price to be paid for the claims is $25,000.

MONTANA.

Inter-Mountain: There will be no cessation of work by the Parrot Company at the new plant at Gaylord. It has already cost in the neighborhood of half a million dollars and it is expected to be in running order by July or August at the latest. The Parrot people have decided to discontinue operations at the Hesperus and a force of men has been engaged in hoisting the pumps and removing the machinery.

A few months ago the Parrot company bonded the Hesperus and Red Chief lodes for $260,000 and began work on the shaft in the former claim, which was developed to a depth of 250 feet. Several stringers of copper ore were struck while sinking, but no ore bodies.

At the Mohegan gold mine at Red Bluff the new 10-stamp mill is in operation, with enough ore in sight to run 12 months.

Butte *Miner*: The great tunnel which was constructed at the cost of $250,000 taps both the Bimetallic and the Granite Mountain, the former at the 1000-foot level and the latter at the 1300. The tunnel drains both mines and will save a large amount of money each month which in the past had to be spent for pumping. At the mill every device for the cheap handling of low-grade ores and the utilization of power will be in use, and it is estimated that there are about 100,000 tons of low-grade ore on the Bimetallic and Granite dumps which will be put through this mill.

The Butte and Boston Mining Company are getting ready to start the Blue Jay. The shaft is down 650 feet, and there is a good body of ore on the bottom, but the ground is mostly worked about this level.

The Emery mine in Deer Lodge county has just been leased for another year. From September 1, 1895, to January 1, 1897, (15 months) the total output of this mine was $119,191; and during that period the royalty paid to the owners of the mine amounted to $27,682.

The Montana Ore Purchasing Company has been given an option on the Nipper mining claim, the bond being for $132,000. During the past year a shaft 250 feet deep has been sunk on the claim, which borders on the Anaconda mine.

Cobban and Rickards, of Butte, have a lease on the Moon ranch, Missoula, and are prospecting for coal. They will either sink a regular working shaft to a depth of 150 feet, or drive the diamond drill into the ground 1000 feet.

The Excelsior mine, Bannack, is employing 50 men. It is estimated that 250 more will have work in the placer and quartz mines in that vicinity next summer.

The Bannack Gold Dredging Company will work the Bon Accord placer ground. Another dredge is being built by this company with a capacity 50 per cent greater than the old one.

Madisonian: The capacity of the plant on German bar for working gravel will be about 800 cubic yards for the shift. From the tower, to which the gravel will be elevated by means of a large scraper-car traveling on a cable, it will work in all directions for a radius of 300 feet, or about four acres. Then the tower will be moved on rollers and slides by means of a powerful engine—a necessary part of the plant. The car will carry about two tons of gravel each trip, and will make trips in a trifle over one minute. It dumps automatically into the high tower; the gold is separated from the gravel by ordinary sluicing methods.

COLORADO.

CRIPPLE CREEK.

(Special Correspondence.)—The district is now producing about 700 tons of ore per day, which, it is estimated, averages about two and a half ounces in gold to the ton.

A recent shipment by the Prince Albert, on Beacon hill, ran $6,200 to the ton. A later shipment ran $700 to the ton.

The Anchoria Leland, for February, shipped 600 tons of ore, which ran about $60 per ton. Two hundred tons besides this went to the chlorination works and ran $20 to $25 per ton.

The Moon-Anchor, on Gold, is opening a 500-foot level to cut an ore chute 20 to 30 feet north of shaft. The latter is down 500 feet. The 400-foot level is now producing.

The Geyser mill has put in an electrochemical process, which the owners believe will fill the requirements for a certain character of ore.

The Gold Coin is shipping about fifty tons per day—three-fourths of it going to the cyanide works at Florence. Gold Coin ores run from $30 to $40 per ton.

Control in the Ashmont was sold to Richardson, Hill & Co., of Boston, for $50,000. The property is on Raven hill.

The Gold Hill tunnel has been driven to a point within 200 feet of the Moon-Anchor vein, which, it is claimed, it will cut at a depth of 320 feet. It will also cut the Anchoria-Leland workings at 650 feet. It is designed to be a drainage and transportation tunnel and the promoters are working in harmony with the surface claimants.

The Alice mine, on Gold hill, has put in a new air compressor and are driving in on the vein. This property is owned by Geo. A. Joslyn and D. V. Sholes of Omaha.

The St. Thomas, on Beacon, owned by the Contract Gold Mining Company, is being developed by a shaft and drifts therefrom. This is only one of a long line of new properties on Beacon, all of which have encountered good indications near the surface. The Lindsay lease is understood to have developed ore worth $65 per ton at 50 feet. The Lanterman property, next to it, is in a fair way to become a producing mine.

The Mutual Benefit Mining and Leasing Company, operating the Chicago and Cripple Creek tunnel on Globe hill, is shipping ore of the value of two and a half ounces per ton from drifts and slopes off the tunnel.

WASCOTT.

Denver *Republican*: At Cripple Creek an option on the Lindsay lease and bond on block 22 of the Arequa townsite has been purchased by Dennis Sullivan of Denver. The price to be paid is in the neighborhood of $50,000 above the bond of the same amount running from the Mabel M. Company.

New York parties have purchased of Ben Brewer the Philadelphia claim, located south of the town of Cripple Creek. The ground is to go into a stock company soon to be organized with a group of claims on Republican mountain.

A station for the fourth level is being cut in the Arcadia shaft at 275 feet. Production is from fifty to sixty tons a month.

Sinking the Independence shaft has been suspended near the point for the 900-foot station. The water flow increased with such force that it was found advisible to stop the shaft until further exploration could be done in the seventh level. The mine is yielding about its usual 1000 tons of smelting ore a month.

The Anaconda is shipping its usual amount of mill ore, from thirty to forty tons daily, or, approximately, 1000 tons a month.

At Telluride, the resumption of work on the Canton illustrates to some extent how gradually gold propositions in San Miguel county, considered unprofitable to work a few years ago, when almost every person's attention was given to mining for silver, are coming into prominence and being leased, bonded and developed.

The Occidental, in the immediate vicinity of the Japan, Tomboy and other well known properties, Savage basin, was recently leased and bonded to George Blackwell and Nate Fields for an agreed price of $35,000.

Near Central City, the output during the past month of the Kansas, Hidden Treasure and Indiana mines, in Nevadaville, operated by the Gold Coin Mines Company, reached a total of $25,000. This same company has also entered into a contract with the California Mining and Milling Company, an English corporation, owning the California group of twelve patented claims on Quartz hill, to purchase the property.

The Old Kentucky Mining Company of Gilpin county has let a contract to sink the main shaft 300 feet below the 400-foot level. A number of ore bodies have been passed through in sinking the shaft, but no shipments of moment will be made until the mine is thoroughly developed.

During the coming season a 100-ton plant for the reduction of low-grade ores will be erected at some point in the San Juan region. A specialty will be made of $12 to $20 ore.

NEW MEXICO.

Silver City *Enterprise*: At Central the new cable for the hoist at the Texas mine has been put on the spool and all preparations made to resume sinking the shaft. The 300 level will be reached and drifts started next week.

The bond on the Lost mine group expires on April 2nd, and from the expressions of the expert sent to examine the property, it is expected the deal will be closed and the new owners will commence active operations immediately.

At Pinos the four mining experts who spent ten days examining the Bell & Stevens properties have gone to San Francisco.

At Copper Hat the new smelter is working successfully and is running full time except Sundays. Work is progressing rapidly in the mines with favorable developments. The company has also started work upon the "Anson S" mine, between Copper Flat and Hanover.

At Mogollon the Confidence mine is producing about 100 tons of ore per day, more than sufficient to supply the 30-stamp mill, belonging to the company, on Whitewater.

ARIZONA.

Phœnix *Republican*: An Eastern syndicate, headed by J. B. Greenhub of Peoria, Illinois, has purchased the property of the Santa Maria Mining Company—six claims on the Santa Maria owned by C. D. Clark and J. C. Rankin of Phœnix. Clark and Rankin bought these mines two years ago, erected a mill and have uncovered large ore bodies. The new company will at once put up more stamps, put in a cyanide plant and work the mines on an extensive scale.

C. L. Hall, of the Mammoth mine at Goldfield, has bonded the Bull Dog mine, and active work will be commenced at once on the mine.

News comes from Oro Blanco that a 12-foot vein of high-grade gold ore has been struck in the mine formerly owned by Hart and associates. The body of ore seems permanent.

Tucson *Star*: The DuQuesne Mining & Reduction Company have bought a 100 H. P. boiler and a 50 H. P. hoist for their mines.

The Ora mine, under the supervision of Mr. Gould, is taking out $1000 a day, besides their concentrates and battery clingings.

The Baxter mines have sent in a large shipment of high-grade copper ore to the smelter, which averages 27 per cent.

Prescott *Journal-Miner*: The Providence Mining Company has struck 2 feet of ore below the 200-foot level which assays high. Their new 10-stamp mill is now running with satisfactory results.

What has been known as the Mexican mine on the lower Hassayampa and from which such fabulously rich ore has been taken at intervals, is again to the front in the production of two large gold nuggets. One of them was of the value of $320 and the other about $90.

MEXICO.

Lower Californian: The San Juan mines, just below the twenty-eighth parallel, in which work was temporarily suspended for a time, are now operated by Messrs. Schramm & Moraga to their full capacity. About 150 men are employed at the mine, and nearly the same number in the reduction works, which are about seven miles distant from the mine and connected by a railroad. The San Juan mines have been operated for the past twelve years. The main shaft is down 1000 feet, with extensive drifts and crosscuts. The ore carries both gold and silver. Of the latter the average is 40 ounces per ton; of the former from $8 to $10. These mines were formerly owned by the Cranz Bros. of San Jose, Cal., who developed the property to its present importance. At San Francisquito the Lacy Bros. of Los Angeles are pushing development work on what is known as the Bareno mines which they recently purchased. They have a large force of men at work, have sunk the shaft to a depth of 95 feet, and have tunneled 100 feet or more. Their machinery, including a mill of twenty tons daily capacity, dynamo for electric lighting, etc., is now on the ground.

The Ibarra Mining Company at Calmalli are opening some extensive bodies of ore, much of which is very high grade, and work will probably soon be resumed on a larger scale than ever.

It is reported that miners are again in demand in the Alamo. Several of the mines in that district are increasing their forces, and a large number of men have left Ensenada during the past week to find work there.

F. M. Bradshaw of the Aurora mine writes that they are hoisting some good rock and are working twenty men.

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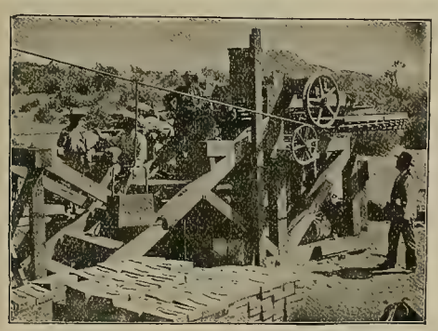
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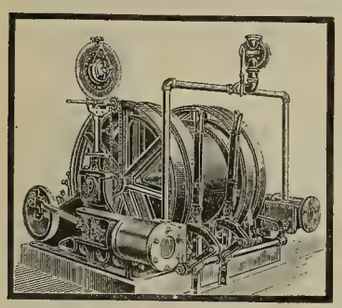
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Coast Industreal Notes.

—The corner stone of the new affiliated colleges in San Francisco will be laid this afternoon.

—Nevada City, Cal., trustees have offered Mrs. Huntington $25,000 for the N. C. waterworks. She asks $28,000.

California dry wines are now selling at 20 cents a gallon. Three years ago the same kinds of wine sold at six cents.

—The contract for the construction of the Valley Road branch from Fresno to Visalia, Cal., has been signed and work begun.

—A San Jose, Cal., brick company has the contract to furnish 3,000,000 bricks for the Spreckels sugar refinery at Salinas, Cal.

—San Miguel, the westernmost of the Santa Barbara channel islands, is to be a big hog ranch run by F. K. Rule. The island comprizes 14,000 acres.

—The Astoria Iron Works of Astoria, Or., has been awarded the contract for repairing the lighthouse tender Manzanita. They will receive $18,800 for the work.

—At San Jose, Cal., the tunnel on the extension of the motor railway into Alum Rock park will be finished in about ten days, and trains will then begin running to the bathhouses.

—Point Richmond has been bought by the San Joaquin Valley Railroad and will be its tidewater terminus. It is the intention to make it a rival to Port Costa in the wheat shipping business.

—At Los Angeles, Cal., the Merchants' and Manufacturers Association has undertaken the construction of a boulevard to run between Los Angeles and Pasadena, ten miles in length and 140 feet wide to cost $300,000.

—Operating officials of the Santa Fe road have decided that the bulk of the 55,000 tons of steel rails recently purchased by that company shall be used in relaying portions of the tracks between Chicago and Kansas City.

—The largest importation of Turkish leaf tobacco ever received at San Francisco, consigned to a prominent firm, will be used in the manufacture of cigarettes. It weighed 7182 pounds and is said to have cost $7000 in Constantinople.

—Last Saturday a tariff on shingles of 62½ cents and lumber 60 cents became effective on mixed cars from Portland, Seattle and Tacoma to Kansas City, Mo., Leavenworth and points in Kansas on the Northern Pacific railroad system.

—At Tacoma, Wash., the Northern Pacific Railway Company will begin work soon on the construction of a seawall of solid stone masonry between its ocean docks and coal bunkers, a distance of 1200 feet. The wall will run from 15 to 40 feet in height.

—The Santa Fe Railroad Company will do considerable repair work this season. Nearly 200 miles of new steel track will be laid between Albuquerque and Barstow at a cost of $800,000. One hundred and fifty miles more of the track will be ballasted with volcanic cinders.

—A new survey of the Pacific, particularly with a view of seeing where the ocean trough east of Japan may best be crossed by a cable, is to be called for at this time. The work will be of scientific value and is a contribution that ought to be made to the Pacific cable project.

—The Great Northern Railway has an arrangement which gives it the option of the Columbia river route to Portland and thence by steamer or taking the longer haul to Seattle and thence by steamer either way, in connection with the Pacific Coast Steamship Company. The Northern Pacific is not in any way connected with the new instructions.

—San Francisco lumbermen are trying to organize a trust to raise the price of lumber from $4 to $5 per M. They claim that the actual cost of milling the lumber is greater than the present prices. The former combination of lumber mills collapsed last year by several mills outside the combination offering lumber at prices lower than those outside of the trust.

—The Corral Hollow, Cal., coal mines are now in practical operation. A large plant, previously described herein, has been put in at the mines, thirty-six miles from Stockton. The coal veins give evidence of continuity, and it is thought the quantity is to be estimated by the million tons. The Pacific Transmission Co. proposes to erect works at the mines to use the screenings and waste in generating electric power and light for Oakland.

—The Oregon Short Line, now an independent line, includes the following branches: Frisco, Utah, to Silver Bow, Mont.; Granger, Wyo., to Huntington, Or.; Shoshone, Idaho, to Ketchum, Idaho; Cache Junction, Utah, to Preston, Idaho; Syracuse Junction, Utah, to Syracuse, Utah; Salt Lake to Terminus, Utah; Lehi Junction, Utah, to Ironton, with branches to Eureka, Monmouth, Tintic, Silver City and Northern Spy mine, Utah. It is unlikely that there will be any unity of action between the Union Pacific and the Oregon Short Line. After May 1 no annual passes of Union Pacific issue will be accepted by the Oregon Short Line.

—The Southern California Power Company, capitalized at $1,000,000, proposes to develop the water power of the Santa Ana river by taking water out at the junction of Bear creek with the river and carrying it in a ditch and pipe line to the head of the present Bear valley canal, there to be delivered to water wheels at 1100 feet head, generating 10,000 H. P. The electric plant in the power house will deliver the current to wires for transmission to Los Angeles, seventy-five miles. The power to be sold to various electric street railway and lighting companies now using steam as a motive power in that city. The *Times* says this can be done at a price which will supplant every stationary steam plant in Los Angeles.

Personal.

T. A. RICKARD has been deservedly re-appointed State Geologist of Colorado.

J. Q. MCDONALD, of Denver, is now managing the Brodie mill at Cripple Creek.

O. H. PACKER, a mining engineer of Junction, Nevada, is about to remove to San Francisco.

W. FRANK DRAKE of Sonora, Cal., has been appointed superintendent of the Reliance Gold Mining Co.

W. S. STRATTON of Cripple Creek has been in Utah the past week looking at some of the mining camps.

P. A. SNELL has been appointed superintendent of the Cactus Mining Company's mines and mill at Frisco, Utah.

BINGER HERMANN of Oregon has been appointed by President McKinley as Commissioner of the General Land Office. The office will now be filled by an honest and competent man.

H. C. HOOVER, M. E., graduate of Leland Stanford Jr. University, and for some time connected with the United States Geological Survey, has accepted an engagement in Western Australia, and left last Wednesday for London, from whence he will go direct to Australia. His work will be to examine some large mineral fields controlled by a London syndicate. Mr. Hoover has for some time been an assistant to Louis Janin, at whose recommendation he obtained the place. His salary is understood to be $5000 a year.

Recently Declared Mining Dividends.

Mercur, Utah, $25,000; payable March 20th.

Bullion-Beck, Utah, $50,000; payable March 20th.

Standard Con. Mining Company of Bodie, Cal., $20,000: March 23.

Western Mine Enterprise Company, Butte, Montana; payable March 19.

Goodenough, Slocan, British Columbia, $24,000, payable March 16.

Napa Con. Q. M. Co., Cal., 10c per share, $10,000; payable April 1.

Slocan Star, British Columbia, $50,000; payable March 25. This is a total of $350,000 paid since August, 1895.

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Alaska Empire Mining Co. and Delaroff Mining Co., S. F.; each company has capital stock of $10,000,000; $50,000 subscribed; G. Niebaum, L. Sloss, W. L. Gerstle.

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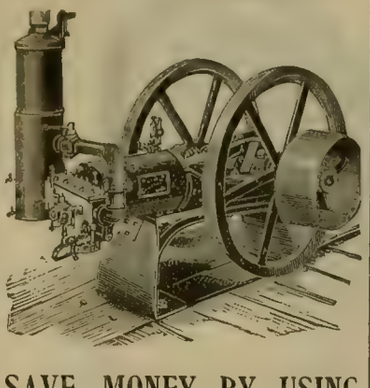
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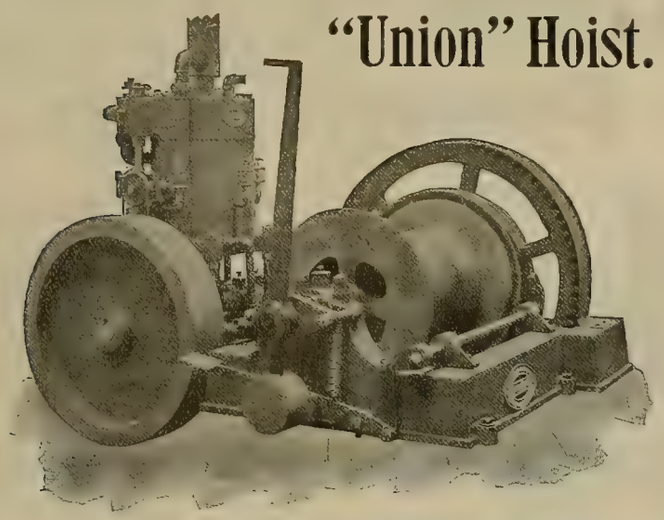
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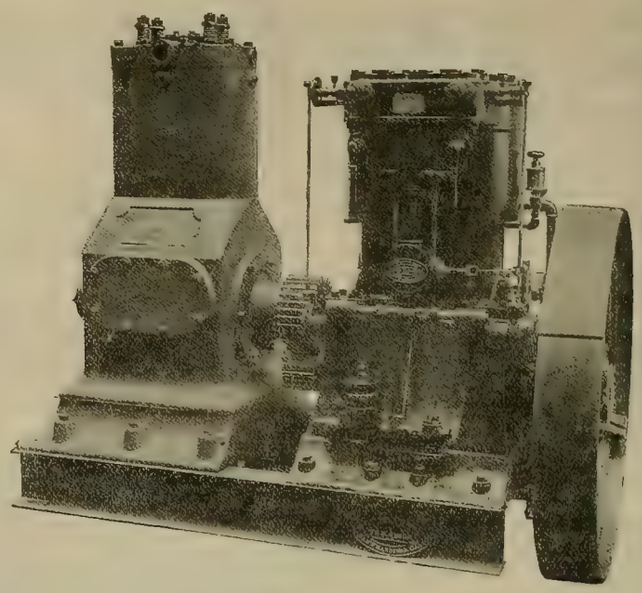
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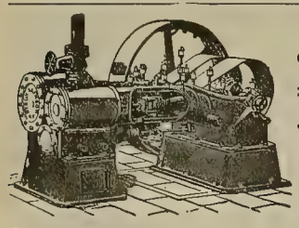
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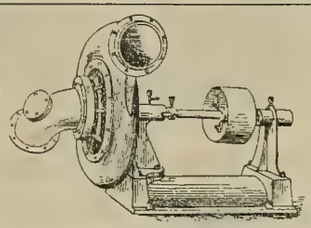
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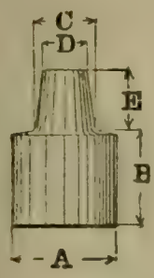
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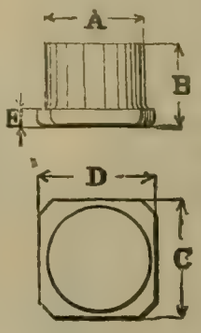
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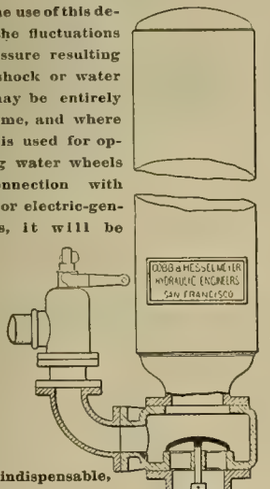
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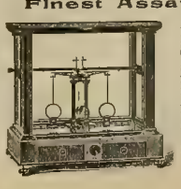
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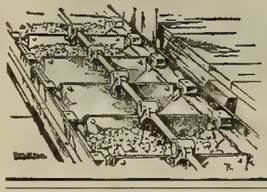
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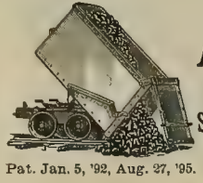
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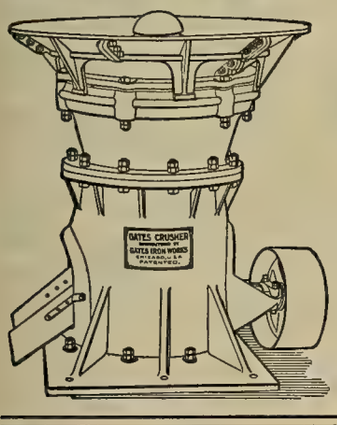


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List of U. S. Patents for Pacific Coast Inventors.

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FOR THE WEEK ENDING MARCH 16, 1897.

578,963.—SMELTING FURNACE—C. Bishop, Tacoma, Wash.
578,716.—TELEGRAPH FIRE HOSE—J. Buchtel, Portland, Ogn.
578,974.—BARREL—O. W. Crawford, S. F.
578,863.—GAS METER—E. B. De La Matyr, S. F.
578,864.—GAS METER—E. B. De La Matyr, S. F.
578,865.—GAS METER—E. B. De La Matyr, S F
578,928.—SAWMILL SET WORKS—R. D. Inman, Portland, Ogn.
578,882.—RAILWAY RAIL JOINT—L. W. Kennedy, Oakland, Cal.
578,995.—LAMP—W. H. Kincaid, Santa Barbara, Cal.
578,762.—FISHING LINE—L. H. McMahon, Salem, Ogn.
578,898.—THRASHER—Nunamaker & Williams, Ione, Ogn.
579,075.—ELECTRIC CALL—Owen, Williams & Donaldson, Garvanza, Cal.
578 902.—SPRAYING MACHINE—A. H. Ruggles, Los Angeles, Cal.
578,952.—SALT BOX—T. Tellefsen, Seabold, Wash.
578,790.—FRUIT PITTER—P. M. Trask, Columbia, Cal.
579,101.—PRESERVING WOOD — Rose L. Valleen, Seattle, Wash.
578,954.—ELECTRICAL APPARATUS—B. C. Van Emon, S. F.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

RAILWAY RAIL JOINT.—Leonard W. Kennedy, Oakland, Cal., assignor one-half to Philip G. Galpin, Berkeley, Cal. No. 578,882. Dated March 16, 1897. This invention relates to improvements in joints for the meeting ends of railway rails, and a means for uniting and supporting them. The object is to bridge the space necessarily left between the ends of rails to accommodate the expansion and contraction, and to provide a means for connecting and supporting the meeting ends of railway rails so as to form a continuous line of travel upon which the flanges of the wheels pass over the joints to prevent bruising and battering the latter. It consists essentially of a plate adapted to fit the form of the side of the rail having a dovetailed head or extension fitting into a corresponding recess made in the rail head, this head and recess forming a lock to hold the sections of the rail together and prevent any lateral shifting of the joint.

COMPOSITE BARREL.—O. W. Crawford, San Francisco, Cal. No. 578,974. Dated March 16, 1897. This invention relates to improvements in the construction of barrels, and it consists in so forming the outer longitudinal staves and the inner metal lining as to make a homogeneous composite package in which the metal interior and the outer cylinder are formed of longitudinal staves, and surrounding hoops are rolled into form, simultaneously forming a composite suructure having interior hoops at the ends to receive the heads which fit therein.

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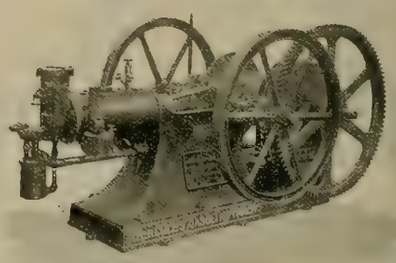
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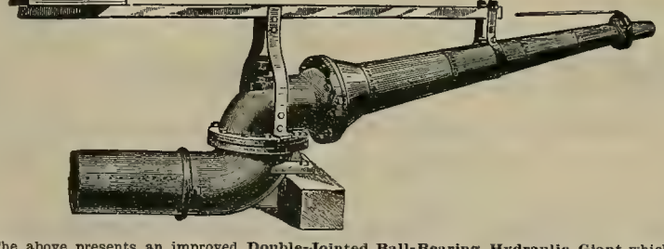
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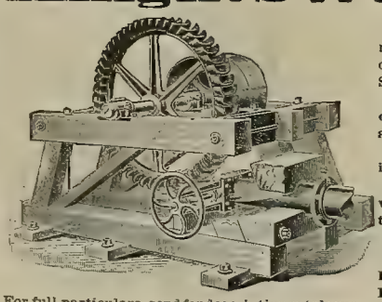
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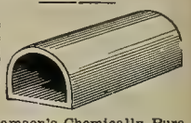
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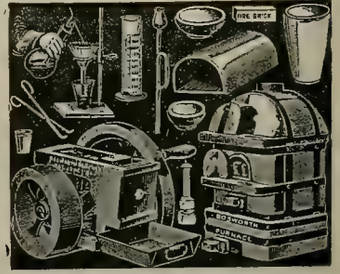
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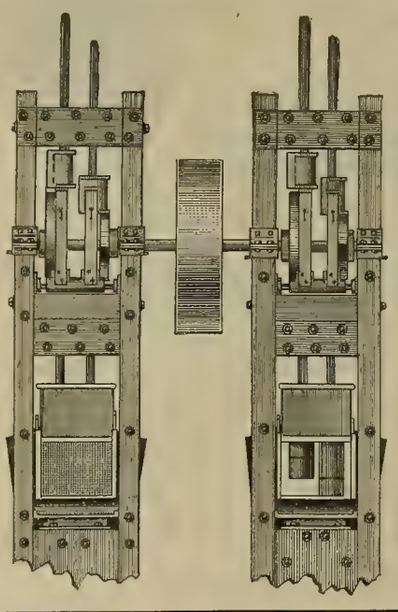
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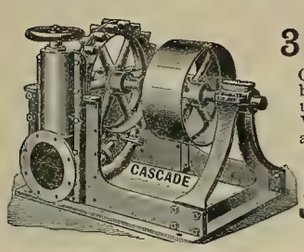
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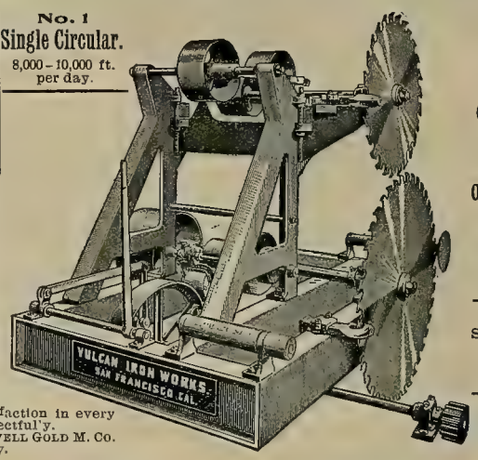
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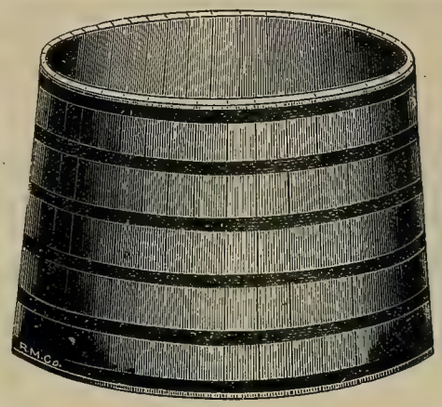
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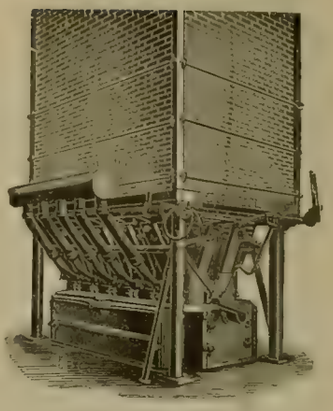
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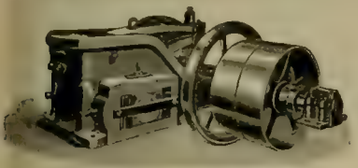
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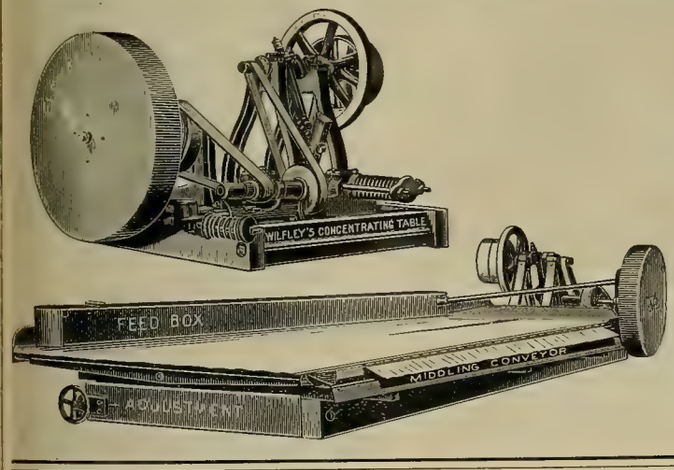
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ROMLEY, COLO., Jan. 19, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Answering yours of the 5th inst., would state that after a thorough trial we have discarded seven Woodbury Tables and two Johnsons and adopted the Wilfley Concentrating Table, which we think up to date is the best table in the market, so far as our knowledge is concerned. Yours very truly, [SIGNED] B. B. MORLEY, M'g'r Golf M. & M. Co.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

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Market Reports.

The Markets.

SAN FRANCISCO, March 25, 1897.

Business continues to revive, but, as yet, slowly. It has been years since there was such a feeling of confidence with the trade and manufacturers. There are few, if any, pessimists, for they have turned optimists. The general trend of values is toward higher prices, which, in itself, is calculated to promote a better feeling. This is in strong contrast with the past few years, for the trend was downward. Tariff talk and uncertainty how the Dingley bill will finally become law, have an unsettled influence on market values on the coast and in the East. This uncertainty also prevents stocking up, except in a few lines, as freely as the trade would if a positive assurance were had regarding the outcome. Several local manufacturers are beginning to run longer time and full-handed. Iron workers in general report increased bids on new work, but owing to close competition low figures have to be named.

The local money market continues to work on easy lines notwithstanding continued remitting to the East. Owing to a small supply of bills in the East, New York exchange is strong at an advance. The money sent to that city is imports from Australia and also by importers here who are withdrawing goods from bond which come from Europe via the East. It is reported in mining circles that considerable money is coming from Europe to this country for investment in mining properties and that more attention will be given to the mines in this State than heretofore. This, it is said, is due to good results secured from former investment. If swindlers and would-be so-called mining experts do not foist poor and worthless properties on buyers we can look for a larger boom in mining in 1898 than will be witnessed this year. The Eastern money markets are reported easy although under an increasing demand for funds the rates of discount begin to strenghten. The improved call comes from manufacturers and also importers of foreign goods. There is a growing impression at the East that gold exporting is owing to the increasing premium on the yellow metal at European money centers. This higher premium has been brought about by the heavy buying of both Russia and Japan.

New York Silver Prices.

NEW YORK, March 25.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	28⅝	62⅜
Saturday	28 11-16	62½
Monday	28 15-16	63
Tuesday	28 11-16	63
Wednesday	28¾	62⅝
Thursday	28 13-16	62¾

	Copper.	Lead.	Iron.	Tin.
Friday	11 85@12 00	3 45	10 00@12 50	13 30
Saturday	11 85@12 00	3 45	10 00@12 50	13 32½
Monday	11 85@12 00	3 45	10 00@12 50	13 37½
Tuesday	11 85@12 00	3 45	10 00@12 50	13 40
Wednesday	11 85@12 00	3 45	10 00@12 50	13 30
Thursday	11 85@12 00	3 45	10 00@12 50	13 35

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	.17½c Prem
New York Telegraphic Transfer	.20c Prem
London Bankers' 60 days	$4.86½
London Merchants	$4.85
London Sight Bankers	$4.89
Refined Silver, per oz., 1000 fine	62¼
Mexican Dollars	49½@50

SILVER.—The market at London advanced to 28 11-16d and the New York market to 63 cents but when the former rose to 28⅝d the latter set back to 62⅝ cents. The advance was due to reports that Japan would not throw her holdings on the market, but what caused the decline we are not advised, but it was probably due to realizing sales. The demand in Europe is said to be slow which has an unfavorable effect for with any selling pressure lower prices would have to be accepted by holders.

MEXICAN DOLLARS.—There is a fair demand at current quotations. The unsettled feverish market for silver bullion is not calculated to promote buying of Mexicans beyond immediate requirements.

QUICKSILVER.—The market has held to steady prices, with a stronger tone as the odds and ends are placed. London and New York advices state that as the markets clean-up of outside holdings values advance to the syndicate's figures. There was exported the past week 320 flasks to Central America and Mexico.

Our market is quoted at $40 for domestic consumption.

COPPER.—Our market is practically unchanged, but Eastern advices state there is an easier tone on the Atlantic seaboard, with Europe bidding lower. For round lots of Lake Superior 11¾ was bid. The dullness in the markets at the East and abroad, with an entire absence of any speculative movement, are against sellers. The increased production in this country and large consumers abroad being supplied for a few weeks ahead are the prime factors in causing weak markets.

The local market is quoted as follows:

Ingot, jobbing	14½@—
Ingot, wholesale	—@13½
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17c

LEAD.—There is a continued free consumption in this country, which, with strong holding, keeps the market up. Europe sends advices of strong markets.

Mr. C. Kirchoff, Special Agent for the United States Geological Survey, in his statement for March 15th, estimates as follows:

	*Tons.
Production of domestic lead for 1896	166,964
Home consumption for 1896	185,589

* Tons of 2240 lbs.

The figures of the Metal Exchange, published in their *Annual Review*, January 9th, were:

	*Tons.
Domestic production	160,000
Home consumption	187,470

* Tons of 2240 lbs.

Our market is quoted in jobbing lots as follows:

Pig	4 00	@	4 25
Bar	—	@	4 50
Sheet	5 62½	@	6 12½
Pipe	4 87½	@	5 37½

SHOT.—The market is firmer at last week's advance.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs			$1 35
Drop, B and larger sizes,	"	"	1 60
Buck, Balls and Chilled, do,	"	"	1 60

TIN—Our market is steady for both pig and plate. Heavy imports of plate are being made of both foreign and American for canners' use. The consumption promises to be larger this year. The East reports a barely steady market for pig and continued cutting in plate.

We quote as follows in a jobbing way:

Pig, per lb		14½c@	—
Plate, I C coke, heavy, per box		$4 05@	4 15
" " light, "		3 95@	—

BORAX.—Market prices and demand are practically unchanged.

The market is quoted as follows:

Refined, in car lots	4¾
Refined, in sacks	5¼
Powdered, in car lots	5
Concentrated, "	4½

POWDER—The market is firm with a good demand ruling.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

IRON.—The market is fairly steady on this coast. The proposed increased duty on foreign has somewhat of an unsettling influence. At the East the markets are easy with a tendency to lower figures owing to strong selling competition. Exports are increasing.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—The market is firm for all varieties on spot and nearby arrivals, but for distant shipments the feeling is easy, yet sellers will not name lower figures. It is stated that the consumption of steam on this coast will show a very large increase this year.

We quote as follows:

SPOT FROM YARD—PER TON.

Wellington	$8 00	@	—
Greta	6 00	@	6 50
Nanaimo	6 50	@	7 00
Gilman	5 50	@	6 00
Seattle	5 50	@	6 00
Coos Bay	—	@	4 75
Cannel	8 00	@	—
Egg, hard	12 00	@	13 00
Wallsend	6 50	@	—

TO ARRIVE—CARGO LOTS.

Australian	5 50		
Liverpool Steam	6 25		
Scotch Splint	—		
Cardiff	6 25		
Lehigh Lump	9 00		
Cumberland	13 00		
Egg, hard	10 00		
West Hartley	6 50		

COKE.—The market is quoted as follows:

Gas Companies'	—		—
English, to load	9 50	@	—
" spot, in bulk	10 00	@	—
" in sacks	11 00	@	12 00
Cumberland	—	@	—

ANTIMONY.—The market is steady.

Our market is quoted at 7⅛@8¼c in a jobbing way. New York mail advices quote 7½c for Cookson's, 6⅞@7c for Hallett's and 6⅞@7c for Japanese.

NAILS—The demand is free and market strong.

Wire, carloads, basis per keg			
" jobbing, " "			$2 25
Cut, carloads, " "			
" jobbing, " "			2 10

SPELTER.—The market is steady, with a fair inquiry reported. The East reports active markets.

We quote our market in a jobbing way at 5 cents a pound.

NICKEL ANODES.—The markets here and at the East are steady.

PLATINUM.—Dealers report a fair inquiry.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC.—The market is steady at quotations.

Our market is quoted at 10 to 15 cents, according to thickness.

Pending tariff legislation unsettles the market somewhat. The general feeling is that prices will advance on several lines.

BONEASH.—There is a good export movement, chiefly to Australasia.

ALUMINUM.—The market is steady. We quote in jobbing lots at 50 cents per pound for ingots.

BISMUTH.—There is a fair inquiry for the season.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is steady to firm.

We quote in a jobbing way at 70 to 75 cents per pound.

Chemicals.

The tariff question is having its effect on the market. The general feeling is that better prices will rule following the passing of the bill. With improving trade the call for chemicals shows an increase.

BONEASH.—The market is firm with a good demand reported.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is reported steady and firm at 2½c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is quiet but firm at $1.70 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a better demand at 2¼c a pound from stores.

NITRATE OF SODA.—Advices from primary markets are to the effect that prices are slightly higher.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported firmer from store at 6½c per pound in carboys.

SULPHURIC ACID.—The demand is fair. We quote in a jobbing way at 1¾c per lb for 66%.

BLUE VITRIOL.—The Eastern markets are firmer. Our market is steady, but dull.

We quote in a jobbing way at 4½c per pound.

Mining Share Market.

SAN FRANCISCO, March 25, 1897.

Dullness rules supreme in the share market. If it were not for cross-orders and other methods to make a good showing, the record of sales would be the smallest known. The muddle in the Hale & Norcross election is not calculated to help matters. The Fox combination have the books, office, all papers and control the mine, while the Grayson-Hayward combination have nothing to show beyond their organization. The latter have a majority of actual shares. Whether theirs are not is a disputed point; and not being properly issued, if Judge Slack's recent decision holds good, cannot be voted. The question is in court and will be settled soon. There is another case in court which ought to be decided soon, and that is the appeal to the United States Supreme Court testing the clause in the State Constitution against margin trading. With these two cases out of the way and also that of M. W. Fox against the old directors of the Hale & Norcross Company, and that of Theodore Fox against John W. Mackay in the Con. Virginia matter, we can then look for better times on the Comstock. Every week creates deeper disgust with outsiders at the way the market acts, and, as this grows, selling becomes the order. Unless things change within the next three or four months, there will not be a corporal's guard left as traders. So far as we can learn, not one of the broker's offices has a ticker. This more than anything else ought to show to what a low point the business has sunk, and yet they live in hopes that history will repeat itself and a valuable strike of ore be made unexpectedly. This has been done more than once, and it is not at all unlikely but it will be again, for the Comstock is prolific in possibilities and the unexpected. Interest continues to be centered on the work in Chollar on the Brunswick lode. The ore now out and in sight will cover the expense of opening up the 500-foot and 600-foot levels, and if the downward continuation of the ore shows an improvement on the upper levels, the shares ought to command higher prices; but if they do not, then present prices are too high.

The work in Con. Virginia and the long west crossdrift being run jointly by Con. Imperial, Challenge and Confidence, are being closely watched, for good results are expected to follow more extended work.

From the Comstock mines the news is practically unchanged. In Alta the superintendent seems to be doing his best to earn his money by prosecuting work, but which is not calculated to strike ore. The same remarks apply to both Overman and Caledonia, although in these two mines the work indicates that it is being done in such a way as to expedite exploiting later on. The work in the former is on the 900 level and in the latter on the 1100 level. No ore was raised last week. The gold-bearing ore found in Seg. Belcher has caused the shares to sell at very low figures. Those holding shares can console themselves with the knowledge that preceding the Con. Virginia deal the shares sold down to 5 cents, and would have gone still lower if the cent dealings had been in force. The decline helped to get shares by the manipulators. From Belcher there is nothing new to report. The letters continue to ignore the ore strike. It is shares, not assessment money, the managers want, and to get them they send prices down. From Crown Point there comes to hand the same old story told for weeks past. From Yellow Jacket no advices come to hand. Well-informed miners think well of the mine. Some go so far as to assert that large quantities of high-grade ore can be extracted when required by the powers that be. The Con. Imperial, Challenge and Confidence joint west crossdrift is being driven at a snail pace. No change is reported in formation. Some work is being done in Confidence on the level reported last week. Some ore has been milled which netted over $880. To get this out cost a considerably larger sum of money. No wonder outsiders have no confidence in Confidence. Alpha's official letter is nearly an exact copy of the preceding week's letter. It

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.	Secretary.
Alma G M Co, Cal	1	5c	Feb 9	Mar 13..Mar 29	D Gutmann, 320 Sansome
Alpha Con M & M Co, Nev	18	5c	Mar 2	Apr 5..Apr 27	C E Elliott, 309 Montgomery
Andes S M Co, Nev	43	10c	Feb 1	Mar 8..Mar 31	Jno W Twiggs, 309 Montgomery
Belcher S M Co, Nev	54	25c	Mar 2	Apr 6..Apr 27	C L Perkins, Mills Bldg
Brunswick Con G M Co, Cal	11	3c	Mar 22	Apr 23..May 15	J Stadfeld
Channel Bend M Co, Cal	7	2c	Mar 22	Apr 24..May 17	J P Langhorne, 39 Sutter
Con Cal & Va M Co, Nev	8	25c	Mar 8	Apr 13..May 3	A W Havens, 309 Montgomery
Confidence S M Co, Nev	28	30c	Mar 12	Apr 16..May 7	A S Groth, 414 California
Con Imp M Co, Nev	38	1c	Feb 16	Mar 23..Apr 13	C L McCoy, Mills Bldg
Crown Point G & S M Co, Nev	70	20c	Mar 24	Apr 28..May 19	James Newlands, Mills Building
Hale & Norcross S M Co, Nev	111	10c	Mar 20	Apr 23..May 14	R R Grayson, 331 Pine
Horseshoe Bar Con M Co, Cal	7	10c	Mar 8	Apr 17..May 8	D M Kent, 330 Pine
Jamison M Co	9	5c	Nov 27	Mar 26..May 21	Sam W Cheney, 120 Sutter
Marguerite G M & M Co, Cal	5	10c	Jan 14	Feb 25..Apr 8	Chas Peach, 237 Twelfth
Mexican G & S M Co, Nev	56	20c	Mar 3	Apr 7..Apr 29	C E Elliott, 309 Montgomery
Mineral Hill M & S Co, Cal	1	5c	Jan 4	Feb 15..Apr 13	Chas Peach, 210 Sansome
Occidental Con M Co, Nev	26	10c	Feb 10	Mar 16..Apr 6	A K Durbrow, 309 Montgomery
Ophir S M Co, Nev	70	25c	Feb 5	Mar 10..Mar 30	E B Holmes, 309 Montgomery
Potosi M Co, Nev	47	20c	Mar 10	Apr 14..May 5	C E Elliott, 309 Montgomery
Reward G M Co, Cal	18	2c	Feb 6	Mar 11..Mar 27	S W Backus, Mills Bldg
Sierra Nevada S M Co, Nev	112	25c	Mar 2	Apr 6..Apr 26	E L Parker, 309 Montgomery

WILL NEGOTIATE with owners or their duly authorized agents only.

WILL INVESTIGATE only thoroughly bona-fide properties, either Mines, Prospects or Mineral Lands, whose owners are willing to make reasonable terms. When sending reports on properties also send terms on which you are willing to sell or lease.

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Marquette, Mich., U. S. A.

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would save time to have several copies struck off and only change the dates and feet run. Even the latter is not necessary, unless for the purpose of fooling the public. From Bullion nothing new came to hand. In Potosi they got into 6 feet of quartz assaying about $27 a ton, and then they ran for old ground, which they succeeded in striking, and, at the same time, struck down the market value of the shares. No work was done in Chollar. In Hale & Norcross they started a west crosscut on the 900 level. The official letter says that work was suspended on the 17th. From Savage, Gould & Curry and Best & Belcher nothing new has been received, so far as official letters show. In Con. Virginia they are working on the 1000, 1550, 1650 and 1750 levels. The letter from the superintendent indicates that work is being done for freer exploiting later on. Only nine tons of ore was raised last week. In Ophir they are working on the 1000 level and also Central Tunnel level. This company succeeds better in finding assessments than ore, or, at least, this has been the case for several years past. The work is in the same direction as reported last week. In Mexican they struck 75-cent ore the past week in their west crosscut on the 1000 level. The official letters do not contain anything worthy of note from Union, Sierra Nevada or Utah. In Andes they are raising from the 175 level for surface connection.

Interest on the Brunswick lode centers in Chollar. They are stoping ore on the 300 level. On the 200 level they have cut out for timber for a west crossdrift. They got ore 2 feet wide. On the 400 level they are opening north on the fifth floor of the north upraise. In the south drift of the 500 level they will run about 60 feet more and then crossdrift for the ore. They will soon be ready to commence operations on the 600 level. In Occidental they are working on the 550 and 850 levels. The ore in both levels is low grade. In Con. Virginia, Best & Belcher and Gould & Curry they are sinking shaft No. 2 and exploiting on the 320 level.

The following illustrates the changes of the week:

MINES.	Mar. 18.	Mar. 25.
Alpha	.....	.....
Alta Consolidated	.....	$ 02
Andes	.....	17
Belcher	.....	.....
Best & Belcher	.....	.....
Bodie	.....	.....
Bullion	.....	.....
Challenge	.....	33
Chollar	$ 1 05	1 25
Confidence	.....	.....
Consolidated California and Virginia	.....	.....
Consolidated New York	.....	.....
Crown Point	.....	13
Exchequer	.....	.....
Gould & Curry	.....	30
Hale & Norcross	.....	.....
Justice	.....	.....
Mexican	27	26
Ophir	.....	90
Overman	.....	.....
Potosi	33	39
Savage	29	.....
Sierra Nevada	26	24
Union	.....	28
Utah	.....	06
Yellow Jacket	29	25

San Francisco Stock Board Sales.

SAN FRANCISCO, March 25, 1897.

9:30 A. M. SESSION.

350 Challenge	33	200 Potosi	39
50 Chollar	1 20	300 Sierra Nevada	24
1000 Con Imperial	02	1000 Silver Hill	01
200 Crown Point	13		

SECOND SESSION—2:30 P. M.

500 Ophir	90	100 Utah	06
100 Mexican	26	500 Savage	29
100 Gould & Curry	30	100 Union	28
100 Chollar	1 25	500 Alta	02
100 Crown Point	25	1500 Andes	17
200 Yellow Jacket	25		

A REMARKABLE difference between Government estimates and prices made in competition occurred in the letting of the contract for Superior harbor. It is stated that E. and J. B. Brayman of Toledo, Ohio, took a big harbor contract at Boston recently at a low figure away from the American Dredging Company at Philadelphia. The latter company retaliated by bidding on the Superior harbor contract of 2,000,000 yards. The Government estimate for this work was $3,065,000. The American Dredging Company bid $1,986,000, and was confident of getting the contract, while the Braymans bid $2,275,000. Local firms learned of the war, and put in a bid of $1,655,000, which is $1,400,000 below the Government estimate. Six members of the Atlantic & Gulf Dredging Association pledged $50,000 each toward putting in a plant at Superior, and offered $1,000,000 to carry on the war if necessary. The lowest bid was 9 cents per yard, while the Government estimate was 15 cents.

THE highest building in New York is that of the Manhattan Life Insurance Company, which is about 324 feet high. The highest building in San Francisco is the Spreckels building, 304 feet. The San Francisco City Hall dome is 300 feet above the pavement.

Who Sees Your Advertisement?

Is an important question. When asked for an "ad" demand proof of extensive circulation among probable purchasers.

THE American Association for the advancement of science will meet in Detroit this year from August 11 to 17, and the British Association will meet in Toronto from August 18 to 25. Besides these fixtures, the four-hundredth anniversary of the discovery of America by Cabot is to be commemorated by the National Historical Association of Canada, who have arranged to hold at Toronto during the summer an exhibition of records, relics, documents, paintings, etc. Finally, the British Medical Association has resolved to visit Canada this year, and it will meet at Montreal on the 24th of August, its proceedings extending over the week.

Rainfall and Temperature.

The following data for the week ending 5 A. M., March 24, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week.	Total Seasonal Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date.	Average Seasonal Rainfall to Date.	Maximum Temperature for the Week.	Minimum Temperature for the Week.
Eureka	1.58	43.41	33.91	35.72	80	62
Red Bluff	.06	22.64	15.49	21.56	84	60
Sacramento	.44	15.65	15.03	16.17	88	62
San Francisco	.14	20.87	15.11	20.17	41	58
Fresno	.62	9.98	4.93	5.86	80	64
San Luis Obispo	.26	20.09	14.71	....	86	70
Los Angeles	.02	16.43	7.88	17.60	88	70
San Diego	.44	11.56	5.68	9.22	40	66
Yuma	.04	5.35	.88	2.81	41	72

PROPOSALS FOR ROCK CRUSHER.

The Board of Supervisors of Butte County, California, hereby invites plans, specifications and proposals for furnishing the following named machinery, viz:

One Rock Crusher, with a capacity for crushing not less than 12 to 15 tons of rock, or cobble-stones 6 to 9 inches in diameter, per hour, at ordinary speed, rock to be crushed to not over 2 inches in diameter. Bids to state the price per foot for elevator attachment, and of rock screens.

One Road Roller, not less than 5 feet in width and to weigh not less than five tons.

All of the above machinery to be first class in every respect.

Bids will be received by the Clerk of the Board at his office in Oroville, Butte County, California, up to Wednesday, April 7, 1897, at 10 A. M. The right to reject any and all bids is hereby reserved.

By order of the Board of Supervisors.

ED HARKNESS, County Clerk.

Oroville, Cal., March 9, 1897.

OFFICE OF THE HALE & NORCROSS SILVER Mining Company, Room No. 11, San Francisco Stock and Exchange Building, No. 331 Pine street, San Francisco.

To the stockholders of the Hale & Norcross Silver Mining Company and to all others concerned:

Notice is hereby given that, pursuant to the consent, in writing, of the holders of two-thirds of the capital stock of the Hale & Norcross Silver Mining Company, duly filed in the office of said company, the principal place of business of said Hale & Norcross Silver Mining Company has been changed from Room No. 3 of the San Francisco Stock and Exchange building, No. 331 Pine street, in the City and County of San Francisco, State of California, to Room No. 1 in the same building, where the business of said Company will be hereafter transacted. This notice is published in accordance with Section 321 of the Civil Code.

Dated March 19, 1897.

By order of the Board of Directors.

R. R. GRAYSON, Secretary.

NOTICE TO CONTRACTORS.

The Monterey Power Company invites bids for putting in its entire plant, dam, flume, wheels, electrical apparatus and pole line from Little River (22 miles south of Monterey City) to Monterey and Salinas City, for the generation and transmission of electrical current of not less than 450-horse power; entire distance being approximately 37 miles.

Bids will be received up to SATURDAY, April 17, 1897, at 2 o clock P. M., at the company's offices, Monterey City, Monterey County, Cal., where plans and specifications may be seen.

All bids must be accompanied by a certified check for ten per cent of the sum of such bid. Checks to be payable to the company and to be held upon the usual conditions.

By order of the Board of Directors.

F. A. BOTSCH, Secretary.

SEALED PROPOSALS.

Bids will be received at the office of the undersigned until 5 o'clock P. M. on MONDAY, March 29, 1897, for one centrifugal pump of 8000 gallons capacity, to be placed in position in new pumping plant at foot of S street, in Sacramento City. Specifications on file at office of City Clerk. A certified check, made payable to City Clerk, for an amount not less than 10 per cent of amount bid, must accompany each bid. The Board of Trustees reserves the right to reject any and all bids.

M. J. DESMOND, City Clerk.

Sacramento, Cal., March 22, 1897.

MOTHER LODE MINE.

A superintendent of a large co-operating mine on the mother lode in California desires an associate with capital to take one-half interest in developing a prospect, located on the mother lode in Amador county, Cal., upon which he is doing development work, with the view of purchase. One hundred thousand dollars has already been expended upon it and its production has been about the same, but the sinking of a shaft 500 feet is necessary to obtain depth. Address SUPERINTENDENT, Mining and Scientific Press, San Francisco, Cal.

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Assessment Notices.

CONSOLIDATED CALIFORNIA AND VIRGINIA Mining Company. Location of principal place of business, San Francisco, California; location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the 8th day of March, 1897, an assessment (No. 8) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 47, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 3d day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room No. 47, Nevada block, No. 309 Montgomery street, San Francisco, California.

HALE & NORCROSS SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1897, an assessment (No. 111) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 11, 331 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of April, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 14th day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. R. GRAYSON, Secretary.

Office—Room 11, 331 Pine street, San Francisco, California.

STOCKHOLDERS' MEETING.—Notice of Stockholders' Meeting of the Alaska Juneau Gold Mining Company. In accordance with a resolution passed by the Board of Directors of the Alaska Juneau Gold Mining Company, a meeting of the stockholders of the company will be held at 2 o'clock in the afternoon on WEDNESDAY, the 21st day of April, 1897, at its principal office, room 23, 320 Sansome street, San Francisco, to consider and vote upon a proposition to increase the capital stock of this company to Five Million Dollars, in five hundred thousand shares at the par value of ten dollars each.

R. M. MEIN, Secretary.

Dated San Francisco, Cal., March 18, 1897.

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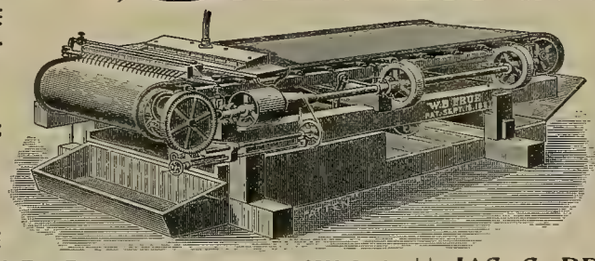
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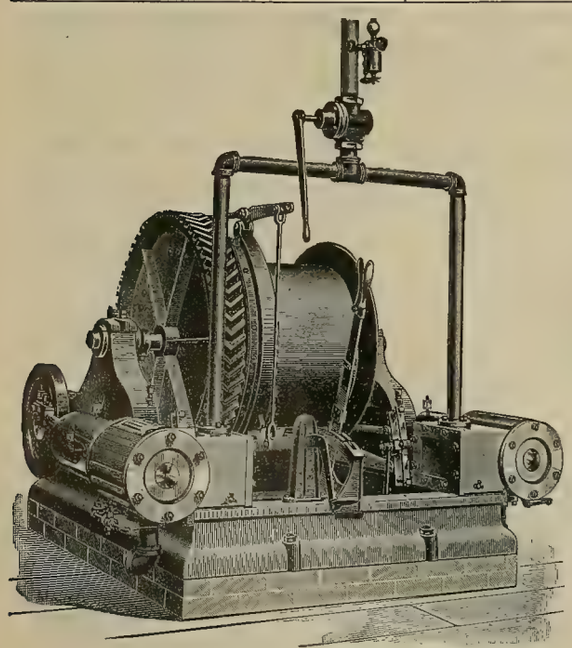
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FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 220 Market St., San Francisco.

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 1917.—VOLUME LXXIV. Number 14. SAN FRANCISCO, SATURDAY, APRIL 3, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

California Building Stones.

The issue of the MINING AND SCIENTIFIC PRESS of February 20th contained an editorial calling attention to the fact that at the University of California at Berkeley the work of testing and examining the building stones of the State has been begun by Professor Lawson, with a view, primarily, to chose materials for the erection of the magnificent buildings contemplated in the schemes for the greater University of the State. It was stated then that the University authorities requested that quarrymen and others interested in deposits from which they believed good building material could be obtained should send two samples of each kind—one a 12-inch cube and the other a 4-inch cube.



JACOBY SANDSTONE QUARRY, HUMBOLDT COUNTY.

Already, Professor Lawson states, so many samples have been sent in that they are blocking up the already overcrowded museum. The work that will be done in this way will be of great value to the State. Examinations made will not only demonstrate the value of the stones of the State for structural material, but will in cases save much needless expense. That there will be a much greater use of stone for building material in this State than there has been in the past is indicated by the larger proportion of stone buildings being erected in San Francisco and other cities of California. The value of these examinations, made, as they will be, thoroughly and well, cannot be overestimated.

According to the report of the United States Geological Survey, the value of various kinds of stone produced in California in 1895 was only $715,450; yet in 1890 the value of granite alone was $1,329,018, and in 1891 $1,300,000. Considering the very small number of buildings erected of stone in the State compared with what will be in the future, this will show that this branch of the mining industry will in time play no small part. Probably in no part of the country may so many varieties of the commoner, as well as more rare stones, be found as in California.

There is hardly a county in the State in which building stone of one kind or another is not being produced for local consumption or shipment to the larger cities. Of course, up to the present time, exorbitant freight rates and poor facilities for shipping have made the cost of bringing to the building centers many better qualities of stone almost prohibitive. However, this is now being all changed.



EUREKA GRANITE QUARRY, PLACER COUNTY.



ROCKLIN GRANITE COMPANY'S QUARRY, PLACER COUNTY.

On this page and on page 283 will be found some illustrations of some of the leading quarries of the State, reproduced from the thirteenth report of the State Mineralogist.

MINING AND SCIENTIFIC PRESS.

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J. F. HALLORAN.....General Manager

TO THE PUBLIC.

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San Francisco, April 3, 1897.

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Entry of Oil Lands as Placers.

The act recently passed by Congress to permit the entry of land valuable for petroleum or other mineral oils, has been published by the Commissioner of the General Land Office with his construction of it regarding its application to cases where claims have been initiated prior to February 11, 1897, when the law went into force. The new law is as follows:

An act to authorize the entry and patenting of lands containing petroleum and other mineral oils under the placer mining laws of the United States.

Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, that any person authorized to enter lands under the mining laws of the United States, may enter and obtain patent to lands containing petroleum or other mineral oils, and chiefly valuable therefor under the provisions of the laws relating to placer mineral claims: *Provided*, That lands containing such petroleum or other mineral oils which have heretofore been filed upon, claimed, or improved as mineral, but not yet patented, may be held and patented under the provisions of this act, the same as if such filing, claim, or improvement were subsequent to the date of the passage hereof.

The Commissioner's construction of the law and instruction to the land officers is as follows:

It is to be observed that though the provisions of the placer mineral land laws are, by said act, extended so as to allow the location and entry thereunder of public lands, chiefly valuable for petroleum or other mineral oils, yet the substances named are not expressly stated to be mineral, in view of which it would appear that the prior assertion of a legal adverse claim to land valuable for petroleum or other mineral oils would preclude the acquisition of any rights thereto under the provisions of the mineral land laws.

Claims to lands of the character mentioned, heretofore initiated under the mineral land laws, are by said act expressly confirmed, but this confirmation must, of course, be construed as applying only to cases where, prior to February 11, 1897, no valid adverse claim to lands involved had been acquired under other than the mineral land laws.

In proceeding under this law you will act in accordance with the views herein set forth.

The Alien Land Law.

The law giving aliens the right to hold land in the Territories which was approved March 2d, last, will be of more interest to the mining industry than probably any other, particularly because foreign capital is turning toward investments so much in that direction. For that reason the law, a copy of which has been furnished the MINING AND SCIENTIFIC PRESS by John M. Wright of this city, is considered worthy of publication. It is as follows:

An act to better define and regulate the rights of aliens to hold and own real estate in the Territories:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that an act entitled "An act to restrict the ownership of real estate in the Territories to American citizens, and so forth," approved March third, eighteen hundred and eighty-seven, except so far as it effects real estate in the District of Columbia, be and the same is hereby amended so as to read as follows:

"SECTION 1. That no alien or person who is not a citizen of the United States, or who has not declared his intention to become a citizen of the United States in the manner prescribed by law, shall acquire title to or own any land in any of the Territories of the United States, except as hereinafter provided: *Provided*, That the prohibition of this section shall not apply to cases in which the right to hold or dispose of lands in the United States is secured by existing treaties to citizens or subjects of foreign countries, which rights, so far as they may exist by force of any such treaty, shall continue to exist so long as such treaties are in force, and no longer.

"SEC. 2. That this act shall not apply to land now owned in any of the Territories of the United States by aliens, which was acquired on or before March third, eighteen hundred and eighty-seven, so long as it is held by the then owners, their heirs or legal representatives, nor to any alien who shall become a bona fide resident of the United States, and any alien who shall become a bona fide resident of the United States, or shall have declared his intention to become a citizen of the United States in the manner provided by the law, shall have the right to acquire and hold lands in either of the territories of the United States upon the same terms as citizens of the United States: *Provided*, That if any such resident alien shall cease to be bona fide resident of the United States then such alien shall have ten years from the time he ceases to be such bona fide resident in which to alienate such lands. This act shall not be construed to prevent any persons not citizens of the United States from requiring or holding lots or parcels of land in any incorporated or platted city, town or village, or in any mine or mining claim, in any of the Territories of the United States.

"SEC. 3. That this act shall not prevent aliens from acquiring lands or any interests therein by inheritance or in the ordinary course of justice in the collection of debts, nor from acquiring liens on real estate or any interest therein, nor from lending money and securing the same on real estate or any interest therein; nor from enforcing any such lien, nor from acquiring and holding title to such real estate, or any interest therein, upon which a lien may have heretofore or may hereafter be fixed, or upon which a loan of money may have been heretofore or hereafter may be made and secured: *Provided however*, That all lands so acquired shall be sold within ten years after title shall be perfected in him under said sale or the same shall escheat to the United States and be forfeited as hereinafter provided.

"SEC. 4. That any alien who shall hereafter hold lands in any part of the Territories of the United States in conratvention of the provisions of this act may nevertheless convey his title thereto at any time before the institution of escheat proceedings as hereinafter provided: *Provided however*, That if any such conveyance may be made by such alien, either to an alien or to a citizen of the United States, in trust and for the purpose and with the intention of evading the provisions of this act, such conveyance shall be null and void, and any such lands so conveyed shall be forfeited and escheat to the United States.

"SEC. 5. That it shall be the duty of the Attorney-General of the United States, when he shall be informed or have reason to believe that land in any of the Territories of the United States are being held contrary to the provisions of this act, to institute or cause to be instituted suit in behalf of the United States in the District Court of the Territory in the district where such land or a part thereof may be situated, praying for the escheat of the same on behalf of the United States to the United States: *Provided*, That before any such suit is instituted the Attorney-General shall give or cause to be given ninety days notice by registered letter of his intention to sue, or by personal notice directed to or delivered to the owner of said land, or the person who last rendered the same for taxation, or his agent, and to all other persons having an interest in such lands of which he may have actual or constructive notice. In the event personal notice cannot be obtained in some one of the modes above provided, then said notice shall be given by publication in some newspaper published in the county where the land is situate, and if no newspaper is published in said county then the said notice shall be published in some newspaper nearest said county.

"SEC. 6. That if it shall be determined upon the trial of any such escheat proceedings that the lands are held contrary to the provisions of this act, the court trying said cause shall render judgment condemning such lands and shall order the same to be sold as under execution; and the proceeds of such sale, after deducting costs of such suit, shall be paid to the clerk of such court so rendering judgment, and said fund shall remain in the hands of such clerk for one year from the date of such payment, subject to the order of the alien owner of such lands, or his heirs or legal representatives; and if not claimed within the period of one year, such clerk shall pay the same into the treasury of the Territory in which the lands may be situated, for the benefit of the available school fund of said Territory: *Provided*, That the defendant in any such escheat proceedings may, at any time before final judgment, suggest and show to the court that he has conformed with the law, either becoming a bona fide resident of the United States, or by declaring his intention of becoming a citizen of the United States, or by the doing or happening of any other act which, under the provisions of this act, would entitle him to hold or own real estate, which being admitted or proved, such suit shall be dismissed on payment of costs and a reasonable attorney fee to be fixed by the court.

"SEC. 7. That this act shall not in any manner be construed to refer to the District of Columbia, nor to authorize aliens to acquire title from the United States to any of the public lands of the United States or to in any manner affect or change the laws regulating the disposal of the public lands of the United States. And the act of which this act is an amendment shall remain in force and unchanged by this act so far as it refers to or affects real estate in the District of Columbia."

John Muir on the Forest Reservations.

In another column will be found an article by John Muir, the great mountaineer—a plea for the preservation of the forests. Miners and prospectors generally know that these reservations will prevent large companies from ruining the source of supply of timber for the mines and be of the greatest benefit to them.

The vigor of the protest that has been made immediately suggests that self-interest is behind it. Those who are really looking out for the interests of miners and prospectors have never shown such activity in public matters.

The members of the United States Forestry Commission are broad-gauge, practical men, who have tramped over the mountain ranges of the West for the past twenty-five years and know every part of them.

It is protested that if the Commission propose any plan for the management and use of the forests they should have presented it before the reservations were made. Yet, in reply to this it may be said that the timber grabbers would in that case have had better opportunities to prevent their ever being made.

The Commission is now busy preparing a plan for forest management. The key note of their whole plan is fair play and use of forests without destruction. If in their plan nothing more should be done than simply stop forest fires, that would enormously reduce the loss. Four-fifths of the decrease in timber in the forests now is caused by fires. Their prevention can only be accomplished by the General Government.

The commission upon whose report these reservations were created concedes that it will be impossible to maintain them, unless some provision shall be made which will permit citizens to search for and develop valuable mineral ledges and deposits, and to utilize the timber within reasonable limitations.

If this provision is made, the miners should consider the reservation of these forests by the Government the greatest boon that could be conferred upon their industry. There is many an old and still prosperous mining district on the Pacific coast that is now suffering through the extravagant and wasteful manner in which the timber of the immediate neighborhood has been cleared off, without regard to the future. Many a mine is paying now twice as much for timber as it would had the neighboring forests been carefully conserved, and the timber taken from them wisely.

Concentrates.

THERE are fifty stamps in the mills in the Cracker district in Baker county, Oregon.

A BOSTON capitalist has bonded John Dobbins' copper property near Yerrington, Nevada.

LOCAL journals state that six new quartz mills will be built this season at Grants Pass, Oregon.

HIGH-GRADE samples of ore have been brought to Salt Lake from the Starlus mine at Bingham, Utah.

PANTING & HANNA have ordered a ten stamp mill for the Burnt River mine in Baker county, Oregon.

ASSAYER PUCKETT of the Denver mint predicts that Colorado will produce $20,000,000 in gold this year.

IN the Horsfal mine, the first one located in Boulder county, Colorado, a strike of rich ore has lately been made.

PREPARATIONS are being made to enlarge the mill at the Mercury mine in Utah to a capacity of 300 tons daily.

IN the vicinity of Ballarat, in the Panamint district, California, there are 150 prospectors, and more coming in every day.

TELLURIUM is being smelted on a considerable scale from Transsylvanian gold and silver ores, near Shemnitz in Hungary.

DR. C. E. AMYDON has deeded to Joseph C. Cramer the Silver Mountain mine near West Point, Calaveras Co., Cal., for $30,000.

THE mines of Butte, Montana, use 1,500,000 pounds of powder yearly—the Anaconda mine nearly two-thirds of this amount.

IT is proposed by the Sumpter Valley railway people to build a road connecting Baker City, Oregon, with the Seven Devils copper region.

IN Southern Oregon fifteen years ago it cost more to pay the freight charges on goods into the mines than the supplies now cost at the mines.

SOME Eastern people have been in eastern Nevada looking at copper prospects, and have made some purchases with a view to developing.

THE Gold Creek, Nevada *News*, says that mica crops out in the Ruby mountains, Elko county, distance sixty miles, and that it is of the best quality.

AN effort is being made to substitute electricity for steam in the mines at Cripple Creek, Colorado. The cost of coal at that place is from $6 to $7 per ton.

AT a recent closing of the Boston & Montana books it was found that there were 1700 stockholders, a gain of about 600 as compared with the previous quarter.

A LONDON syndicate has made an offer of $55,000 for 51 per cent of the stock of the Bonita Gold Mining Company's property near Grand Forks, British Columbia.

SUPERINTENDENT REICHLING, of the Anita mine, in Amador county, California, says a mill with fifteen or twenty stamps will be erected—probably during this summer.

UP to March 20, since January 1, there was shipped from the Kootenay mines ore and matte valued at $2,062,126.64. At this rate the year's output would reach over $9,000,000.

THE Parrott Company in Montana last October took a bond on the Hesperus copper property at $260,000, but, after sinking a double compartment shaft 236 feet, have given it up.

MINERS in Wyoming are arranging to call a convention for the purpose of devising ways and means of bringing the various mineral industries of the State before the public.

EASTERN people who lately purchased the Yankee Boy mine near Laramie, Wyoming, have struck a vein of copper which a press dispatch states runs fifty per cent in pure copper.

THE Silver Star district, Esmeralda county, Nevada, reports twenty-five paying mining properties. That county produced $360,000 in gold in 1896, second in the list, Lincoln being first.

THE discovery of valuable ore bodies in the southern part of the Leadville, Colo., district, may do much toward reviving the camp, and restore the activity which ceased with the strike.

A PRESS DISPATCH from Colorado Springs, Colorado, reports that the Mollie Gibson mine has been leased for a term of five years to a pool at a royalty of 25 per cent and a bonus of $25,000.

TEN shares Calumet and Hecla stock were recently sold in Boston at $370 a share—the highest price on record, at the rate of $37,000,000 for the whole of the stock of that copper property.

THE directors of the LeRoi mine at Rossland, British Columbia, state that they will soon erect a smelter, which will probably be located at Northport, Washington. The capacity proposed is 350 tons daily.

THE output of the Indian gold mines for February was 30,420 ounces, the largest monthly record. There has been a steady increase in the yield since January, 1893, when it amounted to 16,844 ounces.

THAT part of the Columbia & Western railway between Trail and Robsen, British Columbia, is expected to be open for traffic by June 1st, and connection will be made with Slocan lake points by Sept. 1st.

CAPTAIN J. B. DE LAMAR when sailing for Paris from New York last week cabled to his banker in Salt Lake to offer $1,000,000 cash for the Mercur mine. The offer was refused, according to the Salt Lake *Tribune*.

SALT LAKE and Ogden, Utah, men propose the erection of an electric power plant on the Bruneau river to transmit 2500-horse power to the Oro Grande mines, lying between the Bruneau and Owyhee rivers, Idaho.

ACROSS the bay from Ensenada, Lower California, a lead mine discovered some months ago has been developed and the vein—from 8 to 30 feet wide—carries, it is claimed, 68 per cent of lead and some silver, gold and copper.

C. W. SMITH, receiver for the Atlantic & Pacific Railroad, went into Rand district, in Kern county, California, last week, to, as he explained, look over the ground with a view to putting in a branch if the camp develops well enough to warrant it.

IN copper mining in the Lake Superior district in Michigan the rights are vertical from the surface, but in Montana it is under the United States laws, by which the owner of an outcropping vein can follow the same and all its dips, spurs and angles.

THE shipments of matte from the copper-nickel ores of the Sudbury district in Ontario, Canada, to the United States to be refined amounted in 1896 to 3,697,039 pounds against 2,668,661 pounds in 1895. This is the chief source of supply of nickel to this country.

THE report from the Alaska-Mexican for February shows: Period since last return, twenty-eight days: bullion shipment, $25,292: ore milled, 11,245 tons: sulphurets treated, 281 tons: of bullion there came from sulphurets $9590: working expenses for period, $22,216.

A LEDGE of high-grade ore has been cut in the Ontario mine at Park City, Utah, on the 1100-foot level. The same ledge shows on upper levels but not as wide, and the managers expect to cut it on the 1500-foot level. This, if true, will be of vast importance to the district.

YEE SING, a police officer under the Chinese Consul in San Francisco, in an interview with a writer on the *Tribune* in Salt Lake, last week, stated that there are now in California 5000 Chinese engaged in washing gravel and that their earnings averaged from 50 cents to $1.50 a day.

ALEXANDER B. HILL, manager of the Mountain Copper Company, in Shasta county, California, has secured a new bond on the Ballakalala or Windy Camp group of forty claims and development work on a large scale will be commenced immediately to exploit the large masses of sulphide ores.

THE directors of the Mountain Copper Company, in Shasta county, California, will come out from England and visit the property this month. It is intended to bring the question of the ill effects of the fumes from the smelter to their notice, and some action will probably be taken to abate the nuisance.

THE ore shipments from Rossland, British Columbia, for the week ending March 29th broke all previous records and reached a total of 1230 tons. Of this the LeRoi shipped 1060 tons, or more than that mine ever shipped in a like period before. The War Eagle shipped 120, Iron Mask 15, O. K. 14 and Giant 21.

IN Yokohl valley, eighteen miles east of Visalia, Cal., there have been discovered some copper ore deposits, and people interested have secured an option on the tract of 3700 acres of land: that there is plenty of wood and water close by, and the amount of ore appears to be unlimited, containing 22 per cent copper.

AT the Anaconda copper mines in Montana the St. Lawrence shaft is down 1300 feet, the Never Sweat 1430 feet, High Ore No. 1 1200 feet, and High Ore No. 2 1600 feet. The work of connecting all the mines of this company underground is nearing completion. Compressed air will be used to transmit ore from where it is mined to the stations.

THE manager of the De La Mar Mining Company of Idaho has cabled to London the following returns for February: Crushed during the month, 3545 tons; bullion produced in the mill, $41,770; estimated value of ore shipped to smelters, $700; miscellaneous revenue, $95; total product, $42,565; total expenses, $38,030; profit for the month of February, $4,535.

THE famous appeal of the Wells vs. Petty case, which had to decide the meaning of the expression "You will be in on it," spoken by the defendant to the plaintiff, in locating a mining prospect, was decided by the full court in Victoria, B. C., March 26th, in favor of Wells, giving him a half interest in the Monitor No. 2 mine, at Three Forks, and an extension.

THERE is a rule at the Ajax mine, in Utah, that no one may be admitted to the mine without a passport from the board of directors. Last week the owner of 115,000 out of 300,000 shares of the capital stock of the company, Samuel McIntyre, in the absence of the manager, went into the mine without a passport. In consequence, three men who admitted Mr. McIntyre lost their jobs.

IT is announced at Vancouver, British Columbia, that the Dunsmuir estate is interested in the Texada mines and that the Esquimalt and Nanaimo railroad property of the Dunsmuir's is to be extended to the Union coal mines, where coke is made for the Kootenay smelters, and that if the development of the Texada mines continues to be favorable a smelter will be built in that vicinity.

THE Alaska Juneau Company, which recently purchased the Lane-Campbell properties, is preparing to prospect the ore body by sinking a 1000-foot shaft, keeping its forty-stamp mill in operation on the rock taken out. If the ore body continues a large mill will be erected on tidewater and an electric plant on Salmon creek. To connect mine and mill an electric railway may be built.

R. S. MCCONNELL, government geologist, who visited Kootenay last year, has completed some analyses of samples obtained from Trail Creek properties, and in ore from the Columbia Kootenay he discovered gersdorphite, a sulphide of nickel and arsenic. The nickel value of the gersdorphite in the rock examined was twenty per cent, which may mean that the Columbia Kootenay has some considerable value in nickel.

AN English mining syndicate, in which Lord Sudeley and Sir Bache-Cunard are leading members, and with whom J. D. and Dr. Redding and E. A. Wiltsee are associated, last fall purchased the Tarantula, an old idle mine near Tuttletown, Tuolumne county, California, for $20,000 and began development work. Last week a strike of phenomenally rich ore 2 feet in width was made. Hoisting works will be erected and a shaft sunk down 200 feet.

THE Goodenough Mines Company of the Slocan, British Columbia, in its statement recently published shows that from January 14, 1895, to March 12, 1897, there has been shipped from this property 303 tons, 1807 pounds of ore of an aggregate value, according to smelters returns, of $61,581,76, which is at the rate of $203.12 per ton of crude ore. The highest assay of silver to the ton of any single shipment was 817.6 ounces and in lead 70.5 per cent.

ONE of the experts who has lately been examining the Cedros Island mines, off the coast of Lower California, for Kidder & Hellman of Indiana, says that so far no price has been named by the Cedros Island Company, nor has either party to the proposed deal talked regarding the many things necessary to be cleared up, before the trade could be made. The ore is plentiful, but of low grade, and Mr. Kidder will not recommend touching it with less than a 100-stamp mill.

A MEETING of the Executive Committee of the California Miners' Association was held last Wednesday evening, in San Francisco, for the purpose, mainly, of considering the present status of the mineral land bill, and the Legislative Committee was instructed to use every effort in furthering the measure, as it appears to have a good chance to pass at the present extra session of Congress. It was decided to ask that the clause in regard to Oregon lands be left out of the bill, for it would then be more likely to go through. The president, Mr. Neff, and the secretary, Mr. Sonntag, were added to the committee appointed at the last convention to confer with the United States Debris Commission.

THE Toronto *Globe* advertises the prospectus of the Colorado Gold Mining and Development Company, which has been incorporated under the laws of West Virginia by men living in New York, and which has its property in Kern county, California, its principal place of business in Rochester, New York, and to cap the climax the stock is being placed in the Toronto market. The capital stock is placed at $2,000,000. The mines are the Keyes, Three Chimneys and other locations in Kern county.

THE St. Petersburg Department of Mines has issued a book on the mineral resources of the Caucasus. The author states that gold is met with in the Archæan rocks on the southern slopes of the Caucasus, as well as in alluvial deposits. On the whole, however, the Caucasus is poor in respect to gold deposits. Lead ores occur in the districts of Artwin and of Batoum, but they occupy a subordinate position in association with copper ores. Copper ore, usually met with in beds, is widely distributed, usually in company with lead and zinc.

THE Alaska Treadwell Gold Mining Company has commenced work on a 1000-foot five compartment shaft 8x22, the first 270 feet to be completed May 1st, when a new hoisting plant will be in place and the shaft driven 20 feet per day. If satisfactory the company will erect a mill of 300 additional stamps, and the working force increased to nearly 1000 men. The company has decided to replace the present water and steam power plants by which the Treadwell and Mexican mines are operated, with electric power. The cost of the plant is placed at $500,000.

THE Montana Company at Marysville, Montana, have decided to put in the long talked of plant at the Drum Lummond mine for working over the tailings dump of about a million tons, and contracts have been entered into for its erection. Cyanide will be the process and the capacity will be 500 tons daily. The results of the working of the process on such a large scale will be looked forward to with interest—particularly as to the cost per ton. There are many other dumps in this country held by owners on speculation, waiting for further reductions in costs of working.

THE annual report of the Alice Gold and Silver Mining Company of Walkerville, Montana, shows a product for the past year of $547,416.95 in silver and $16,465.27 in gold, the whole reaching a total of $563,882.22. During the year there was 548 bars turned out of the mill, while in addition to this 4385 tons of base ore were sold, the whole showing an average of $32.70 per ton. In the Blue Wing claim the mill returns show an average of 100 ounces silver and gold to the value of $40 per ton, the width of the pay-streak varying from 10 inches to 2 feet, with the vein 4feet between walls.

THE annual report of the Boston and Montana Mining Company states that the electrolytic plant at Great Falls, Montana, will soon be producing 3,500,000 pounds per month. The gross receipts were for the fiscal year $6,413,307, the total expenses $3,534,283, the net earnings $2,674,350. Dividends, $1,500,000; surplus for year, $1,174,350. Total surplus, $2,740,328. Ore reserves, tons, 950,000; assets, $3,128,971; liabilities, $388,642; and surplus, $2,740,328. The total dividends declared to date since the first one paid in August, 1888, is $5,375,000. The gross receipts for 1896 amount to $1,415,076 more than in 1895, while the total operating expenses have increased about $900,000.

IT has been suggested that a convention be held in Denver, Colorado, during the present year to consider the subject of gold mining. On this subject the Denver *Republican* says: "Intelligent Colorado people know that through the development of the gold resources of this State local prosperity may be secured. But of this the East is ignorant. It has been printed hundreds of times in Colorado papers. But comparatively few Eastern people have heard anything about our claim in this respect, and possibly some who have heard have attributed it to idle boasting." It is further suggested that the convention be not representative of Colorado only, but that delegates be invited from all other gold-producing States and Territories in the Union, and also from British Columbia and Mexico.

UNDER date of March 30th, Secretary Sonntag, of the California Miners' Association, writes: "I deem it necessary that the journal representing the mining interests of the State of California should be notified of the fact that the California Mining Association is very sadly in need of funds. I much regret to state that this year the counties which have very materially aided in the good work of the association have not responded to appeals of its officers as they did last year. It has been decided by President Neff to have Mr. S. K. Thornton, of this city, visit the mining counties on a collecting tour. The work performed by the association speaks for itself. It is to be sincerely hoped that the miners of California will respond liberally to our appeal. If the organization is to be maintained, it has got to have the support, not alone moral, but also financial, from the miners of California. Last year, at the annual convention, a showing was made whereby the entire indebtedness of the association had been paid, and over $500 still remained in the treasury, but we have had considerable expense for the convention and other matters incidental to the work of the organization. None of the officers draw a dollar of salary, and it is certainly to be hoped that this last appeal will bring about good results."

THE Dingley tariff bill passed the House of Representatives last Wednesday, March 31st, and now goes to the Senate. The lead schedule is as follows: "Imported lead-bearing ores of all kinds shall pay a duty of 1 cent per pound: *Provided*, That on all importations of lead-bearing ores the duties shall be estimated at the port of entry, and a bond given in double the amount of such estimated duties for the transportation of the ores by common carriers bonded for the transportation of appraised or unappraised merchandise to properly equipped sampling or smelting establishments. On the arrival of the ores at such establishments they shall be sampled according to commercial methods under the supervision of government officers, who shall be stationed at such establishments, and who shall submit the samples thus offered to a government assayer, designated by the Secretary of the Treasury, who shall make a proper assay of the sample, and upon his report of the lead contents of the ore the import entries shall be liquidated thereon. And the Secretary of the Treasury is authorized to make all necessary regulations to enforce the provisions of this paragraph. Lead dross, lead bullion or base bullion, lead in pigs and bars, and old refuse scrap lead, fit only to be manufactured, 2 cents per pound; lead in sheets, pipes, shot, glaziers' lead and lead wire, 2¼ cents per pound."

Gold Mining in Siberia.*

Written for the MINING AND SCIENTIFIC PRESS by
RUSSELL L. DUNN, M.E.

Gold mining has been profitably carried on in Siberia on a large scale almost as long a time as it has in California, but in technical development it is still in its infancy. While elsewhere in the world where gold is mined the processes and methods employed are the most advanced that the experience of California and other districts have developed, the Siberian gold mining is for the most part limited to the knowledge and methods with which the industry started there. The prominence acquired by gold mining during the last few years has directed attention to Siberia as a possible source of large gold returns through the use of the capital and experience of other countries. It has very naturally been presumed that a country which could for many years produce so large an amount of gold, using primitive methods and appliances, could produce very much more and much larger profits by the use of foreign capital and experience. As the conclusion of the study of Siberian mines and mining conditions on the ground during the last few months, I should say that, while this presumption is partly true, it is very largely misleading.

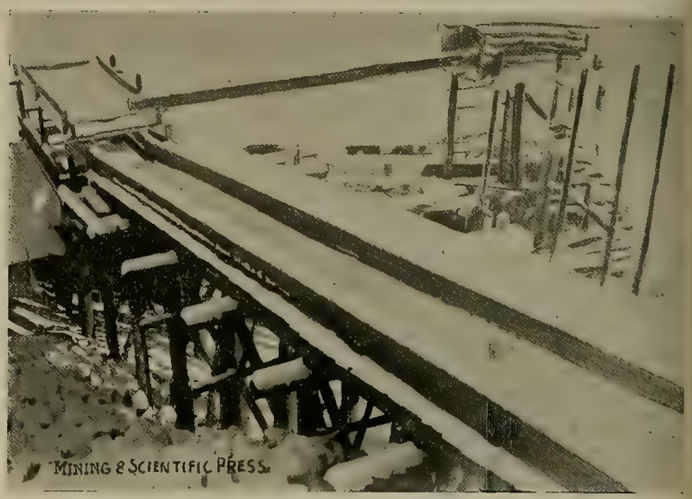
Siberia is a large gold producer, because it is a very large country. The unconscious comparison of yields is made with countries very much smaller than it, and, consequently, to the disparagement of the latter. In Siberia gold is found scattered over an area about 3000 miles east and west by 1000 north and south. In addition, there is the small Ural district, not included in the preceding, from which comes a large part of the total annual production credited to Siberia. In my recent visit, my route of travel to and from the country crossed the Urals, south of the gold mining district, and thence was by the line of the Siberian Transcontinental railroad, across the vast plains of the Obi river system and the low hills of the divide between it and the Yenisei basin to the latter river. From here the main overland wagon road taken runs through the foothills of the Altai mountains to Irkoutsk, on the Angara river, a distance of about 700 miles. Thence, crossing Lake Baikal, the route was over the plateau region lying close up to the summit of the Altais, which it crossed into the headwaters of the Shilka, the principal northern tributary of the Amoor river, and descending the canyon of that stream into the heart of the Nertshinsk district, 1100 miles from Irktousk, where I made a detailed examination of a tract of mining lands nearly as large as the entire gold-bearing Sierra region of California. Though close to the navigable Shilka river, I was still nearly 2000 miles by that river and the Amoor from the Pacific ocean. The gold-bearing district may be considered as extending from the Yenisei river to the Pacific ocean and from the southern limit of the Amoor drainage and the Altais northward till the foothills disappear about the Arctic circle in the vast swampy plains that border the Northern ocean. Considerable as was the area examined by me and the territory covered in my route of travel, it is only an insignificant fraction of the the total gold-bearing area described. Still, with all the comparison that it was possible to make from the published reports on other fractions and inquiry of Siberians who were informed, I am assured that the regions seen by me are fairly representative of the whole.

All of the gold yield of Siberia has up to the present time come from shallow surface placers, such as were worked in the river bars and foothill gulches of California by the first gold seekers. These shallow placers in Siberia are numerous, but scattered, and only exceptionally are they rich, measured by the yield of similar California placers. The evidence of formation from the direct erosion of auriferous quartz lodes seems to me conclusive, though in the few instances that I learned of in which the quartz lodes were discovered, the Siberian miners failed to appreciate their gold-bearing value. These lodes seem to be very similar in character to our California lodes, and to have been formed, like them, in connection with intrusive eruptive rocks. They have apparently neither been eroded very deeply nor by torrential streams, so that the gold of the placers is not very far from its source in the lodes. The erosion has all been done by the existing streams, which have made flat, swampy valleys, a portion of which form the placers. Not every valley or gulch is auriferous; in fact, the proportion of the whole number is surprisingly small. Also, only a small portion of the length of the auriferous valleys is sufficiently rich to be considered a placer. While, as a rule, much wider than the stream that formed it, the placer is seldom over a third of the width of the valley that contains it. The depth of the placer varies from a few inches to 30 or 40 feet. Only the lower fourth of this resting on the eroded bedrock is auriferous. The remainder is a barren overburden, similar in physical composition to the other portion, except that it contains no gold. Through a vast region, including that which I particularly examined, the placers are perpetually frozen, except for the couple of feet or so of swampy surface. The method of working these placers under such unusual conditions is quite interesting, though not to be commended as economical. It is in two stages—first, prospecting to determine possible values, and, second, the exploitation proper. Both are controlled by the physical conditions created by the climate. The time required as a result of these conditions from the initiation of prospecting to the prosecution of the exploitation is three years, two of which are required for the prospecting and the third for the working of the ground located by the prospecting as sufficiently rich in gold to pay a profit.

Prospecting is done as follows: In the late autumn in the valley that has been selected for prospecting tranverse lines are staked out about one-third of a mile apart and points designated in these lines spaced 40 feet between, at which points prospect holes, termed "shurfs," are to be sunk. As soon as the swampy surface is well frozen the work of sinking these shurfs is commenced, one or two men working together, sinking a number simultaneously. In dimensions they are about 7 feet square and reach to bedrock at depths from 6 to 25 feet. To dig them the ground is first thawed out by building fires. These soften the ground to a depth of 7 inches for each firing, the softened ground being removed by the pick and shovel. When gold begins to appear in the ground each successive 7 inches of softened wash is deposited by itself by the side of the shurf and marked with a stake giving its depth from the surface. The foreman or engineer prospects these saved layers and finally with a 72-lb. sample washed either in the Siberian batea (a shallow wooden bowl about 22 inches in diameter) or in the



SIBERIAN GOLD WASHING MACHINE.



SLUICE, ETC., OF WASHING MACHINE.



SIBERIAN FLUME BUILT ENTIRELY OF POLES CAULKED WITH MOSS.



PROSPECTING.

* The photographs from which the engravings with this article were made, were taken on the ground by Mr. Dunn for the MINING AND SCIENTIFIC PRESS on the occasion of his visit to that region in September and October, '96.

Siberian sluice (which has its nearest comparison in a mortar mixing bed), and determines the weight of gold that a unit of 3600 pounds of the wash will contain. This he marks on a rough plan map of the shurfs and also marks the respective depths of overburden and of "pay." This washing is usually done in the following summer. From the mapped figures he decides whether or not to prospect further. If sufficient gold is shown to pay on working, other intermediate lines of shurfs are staked out, about 100 feet apart this time, and in the following winter they are sunk, prospected the next summer and mapped. These more complete mapped figures may justify exploitation and possibly they may not. If the engineer decides that they do he plats on the map what is termed a "project," designating the boundaries of a pit to be worked and calculates the several dimensions of it: length, breadth, area, depths of overburden and pay, cubes of each, average estimate of gold yield per unit of 100 poods (3600 lbs.) of pay, and the total estimate of gold content. On this map the subsequent exploitation is based.

The present method of exploitation begins with taking the ground mapped out as a workable project in the early winter. Buildings (log structures) are erected close to the works for the men and horses to be used, and advantage taken of the snow to sled in all the supplies and forage for the coming summer as well as for the winter. The pit is staked out to conform to the map made by the engineer, the ground within is cleared of timber and brush, and the surface to the depth of 3 feet or less is removed while half frozen, as it works easier then than when a swamp in summer. With this upper 3 feet go all the tree stumps and roots. The ground is broken out in large lumps with a heavy crowbar used a churn drill, broken up with a sort of pick and shoveled into dump carts which deposit it alongside of the pit as convenient. A ditch is constructed to divert the water of the stream in the valley and to provide water for the washing machine.

This last is prepared or started. It is located at or near the lower end of the pit and constructed of round timbers. A driveway on an incline is built on trestle bents up to a platform from 25 to 30 feet high above the surface. The carts carrying 1000 to 1600 pounds of auriferous earth dump on this platform over a shallow chute conducting to the washing sluice. From the ditch above referred to (or replacing it entirely if all the water is taken) a flume made of round poles, caulked with moss, on trestle bents, brings water to the machine. This is fed in at the head of the sluice with the auriferous earth and washes it down the sluice. The sluice is a trough made of smoothed square timbers or planks, 6 inches deep, 2 feet wide and 30 feet long (different machines vary these dimensions), set on a slope of about one drop to six horizontal. Wooden riffles are set in the bottom to catch the gold, and there are inclined platforms alongside used by the workmen in removing large rocks and clay masses. The former are piled alongside as convenient and the latter thrown into a box having a sheet-iron perforated bottom set at the foot of the sluice. Here they are rubbed up with water fed from a branch of the flume till they pass through the perforations into another sluice set at even a steeper angle than the first and mingle there with the washings from the upper box. At the foot of the sluice box coming from the dump platform is a box arranged to take the cleanup from the riffles to the cleanup room (made of slabs) and from the termination of the second sluice a similar box takes the riffle contents to the cleanup room. This last is furnished with a so-called Siberian sluice and a water supply from the flume. From the lower sluice the structure is continued in a narrower sluice (made of poles caulked by moss), still on a steep grade till the bottom is about 3 feet from the ground and then takes very nearly the slope of the surface of the valley, and is continued to discharge the water below a point at which it can back into the excavated pit, a distance from 150 feet upward. At the upper end of this pole sluice the heavy tailings, sand and gravel are caught in one or more traps built the full width of the sluice, with open bottom close to the ground. As tailings accumulate they are removed from below, shoveled into carts and dumped in piles as nearby as convenient.

The description of the machine (?) has been accompanied by a description of its operation, and to that extent is anticipating. The upper 3 feet of the surface of the pit is all that is removed during the early winter. In the following spring, soon as the ground thaws, the remainder is removed in benches of 3 feet or so in depth, the extent of the thaw, horses and carts being used, and the overburden being removed separately from the auriferous bottom. The latter goes to the machine and is treated as above described. Local conditions modify the description of machine given above, advantage being taken of an old pit or steep hillside sometimes, and occasionally a revolving perforated iron cylinder is used to wash the gravel.

As above stated, the Siberian placers are not notably rich and the cost of working by the method described is high. The minimum that will pay costs is about 30 cents a cubic yard, measuring both overburden and pay, and in some districts 50 cents. The placers worked range in yield from the minimum figures given above up to $2 and $2.50 in the richest placers. It is hardly necessary to say that the lower yields are more often obtained than the higher, and in no case should expectations of continued return be based on these latter. While the character of the placers and the manner of their formation are such that they frequently contain rich sections, these rich sections are quite limited and short-lived if actively exploited. Absolutely, compared with placers now being worked in California and Oregon, they are not as rich. In gold content the average Siberian placer has less than $50 per linear foot of channel. In California the average is safely double that.

The cost of Siberian placer mining can be materially reduced, but there does not seem to be much opportunity for our hydraulic methods. They are out of the question in the frozen placers and only exceptionally available for placers that thaw out in summer down to the bedrock.

Quartz mines cannot be said to exist in Siberia yet, but auriferous ledges unquestionably head every placer deposit. Some of these, in the aggregate an enormous number, will undoubtedly make quartz mines offering possibilities of profit equal to those of any other country. The industry has to be created, however, and practically entirely from the outside. Even the prospector who is to find the ledges is unknown in Siberia. There are no tools in stock, or even sample, that a quartz miner must have. I doubt if even a gold pan could be found or, except at the mint at Irkoutsk, an assay outfit. There is no mining or milling machinery, and there is neither the knowledge nor plant to construct it. It is doubtful if there can even be found the mechanical skill required of mine blacksmiths and millmen. All of this is the more surprising considering the long occupancy of the country by the Russians and the gold mining industry developed during the last fifty years.

What the country needs is many of the all-round working miners of California, men who besides being miners are mine blacksmiths and carpenters, can assay quartz, operate a hoist and run a stamp mill. It is not, however, a country for them to go to, except under engagement. The conditions of life are not pleasant, and the language and fixed habits of the people difficulties hard to contend with. There should be quite a good market there, (to be developed of course, for the Siberian miners do not themselves know what they need) for certain types of light portable mine and mill machinery and mining tools. The climatic and transportation conditions impose limitations on quartz mining operations that rarely have to be considered in other countries. Neither the roads nor road vehicles admit of the transporting of heavy machinery. Distances from bases of supply are often enormous and the means of communication poor. Telegraph lines are few and the letter post exasperatingly uncertain, stopping entirely in the last month of autumn and in the first month of spring.

Siberian mining conditions interested me particularly by reason of the conditions of mining in Alaska being comparable. The latter country would seem, however, to offer the better present opportunities. The climate is more moderate, transportation facilities considerably better, and there is on the ground exactly the class of intelligent miners required to rapidly and economically build up a profitable mining industry. A few years of the energetic exploitation which has built up the Transvaal gold mining industry will, however, result in the disappearance of most of the existing difficulties in Siberia and will enable the prosecution of the industry on even terms as to costs with other countries. This is comprehended by the Siberian mine owners and the Russian capital now active in developing the enormous dormant gold-producing resources of their country. It is quite in reason to anticipate a very large increase in the annual gold yield of Siberia, possibly to the extent of doubling its present figure, within five years.



"FIRING" FROZEN GROUND TO SINK SHURFS.



SIBERIAN ROAD RIG FOR SUMMER.



WINTER TRAVEL IN THE MINES.

Practical Treatment of Pyritic Gold Ores at Gibbonsville, Idaho.

Written for the MINING AND SCIENTIFIC PRESS by C. C. BURGER.

A general description of the property of the American Developing and Mining Company at Gibbonsville has been published, but it is thought that a more detailed sketch of the reduction plant, and the methods of treatment employed therein, may prove of interest.

The problem to be solved was the economic treatment of a low-grade pyritic ore, averaging in value about $10 a ton. The character of the ore is magnesium slates and quartz, more or less impregnated with iron pyrites. These pyrites are fairly pure, containing from .5 to 1 per cent copper, and occasionally a trace of lead, while arsenical pyrites are rather frequently encountered. The ores of this section were worked, as long as they were free milling, by arrastras and primitive stamp mills; on turning base, as the mines became deeper, many methods were employed to save the values. Several badly constructed chlorination works, a cyanide plant, a process consisting of roasting the ore and subsequently amalgamation, were tried, all of which proved total failures.

The success of the plant designed and operated by Bernard MacDonald and the writer for the past year and a half is conclusive evidence that such ores are readily amenable to careful treatment.

The general character of the plant is stamping the ore wet, running the pulp over copper plates, the sulphurets in the pulp being then saved on Frue vanners. The concentrates thus obtained are roasted in a Pierce turret furnace, supplemented by a small reverberatory. The roasted ore is then subjected to barrel chlorination.

The ore as delivered from the mine is run through a Blake crusher and Cornish rolls, falling into the battery ore bins, about ¾ to ½ inch in size.

The stamp battery consists of thirty 950-pound stamps. The drop is from 6½ to 7½ inches, 94 to the minute. Size of screen used, 30 mesh, No. 29 Tyler steel wire. The mortars are narrow, double discharge, the height of the latter being maintained at about 4 inches. Eight-foot silvered copper plates are placed in front and back of each battery, the grade being 2 inches to the foot. The whole design of the battery is to attain, by means of a short, quick drop, comparatively coarse screen and low discharge, a rapid crushing and discharging of the pulp with the production of a minimum amount of slimes. We endeavor to strike a mean between the extremes of sliming the sulphurets too greatly and that of saving too little of the gold contents of the ore as amalgam. The battery accomplishes this very successfully, its daily output being from three and a third to three and a half tons to the stamp; together with this rapid crushing, 50 to 55 per cent of the value of the ore is left on the copper plates. The sulphurets in the pulp are left in such a suitable condition for concentration that enough concentrates are saved to bring the total recovery of the values in the ore to 90 per cent and over.

A word about double discharge mortars may be of interest here. Many objections are raised against this style of battery, such as that the back screen is too quickly broken or worn out by the ore as it drops from the feed chute, being dashed against it by the falling stamps; that a back screen is very unhandy to get at, and the battery men will not take pains to keep it open and clean, and so on. Our experience is to the contrary. The back screen lasts as long as the front one—from ten days to two weeks—the additional discharging capacity accentuates our speed of crushing at least one-third, and we think that a double discharge mortar is eminently suitable where the fast crushing of a pyritic ore, with the production of as few slimes as possible, is desired.

After the pulp leaves the battery tables the amount flowing from each ten stamps passes through a Brown hydrometric sizer, where it is divided into five classes, each of which flows onto a 6-foot Frue vanner, adjusted as to speed, inclination, etc., to conform to the size pulp it is intended to treat.

This method of sizing mill pulp before concentration has proven very successful here. The coarsest material is treated on a machine making 208 shakes per minute, with a 6-foot per minute belt travel, the inclination of the belt being 3½ inches. The finest material is treated on a machine making 174 shakes, with a 4-foot belt travel and 2⅜-inch inclination. The three intermediate vanners are graded proportionately.

Sizing before concentrating on vanners is a subject much discussed and combatted at present. Our experience, after numerous tests and assays of feed and tailings, lead us to assert that such treatment is highly successful and eminently desirable; in fact, without sizing, our saving of concentrates would not be nearly as great as it is. Concentrating on vanners may be likened to hand vanning. In the latter, if it is desired to separate coarse material, it is only common sense to give the pan a quick motion. If the material desired to be saved is very fine and impalpable, the operator will proceed slowly and carefully. Will one not make a better saving by separating his pulp into sizes, giving each size the proper motion, than by treating a mixture of sizes by a motion adapted to neither the coarse nor the fine particles? In machine vanning the reasoning is exactly similar, and our experience bears it out in practice.

One authority—Mr. Goodale of Butte, Montana—asserts, in his article on ore dressing, as carried out in Butte, that better results are obtained by treating a mixture of sizes, one of the reasons given being that, in his opinion, the coarse sulphurets serve as a trap for the fine material, preventing the flow of water from washing them away. This may be true when the mineral is all settled down upon the belt, but how would it affect the material, while in suspension, before it reaches the belt? This is the danger point in concentration. It is not nearly so difficult to recover mineral that is once settled on the belt as it is to get it there.

Reasoning and theory on either side of the question are all very well, but results are what count. The facts that our percentage of extraction ranges from 90 to 93 per cent of the value of the ore; that a well constructed canvas plant, built to operate on the tailings, was an economic failure, the per cent of slimes lost from the vanners being too small to even pay the expense of running the plant, would show, as compared with the results obtained in some mills treating a similar class of ore, that sizing is a decided advantage and certainly does no harm.

The concentrates obtained are elevated to a feed bin in the top of the roaster building. This plant comprises a standard double hearth Pierce turret roaster, supplemented by a small single-deck reverberatory, the latter capable of holding two 1½-ton charges. This type of mechanical furnace is so well known that it is hardly necessary to describe it, beyond stating that the hearth is a complete circle, and the machinery moving the arms and rabbles is placed inside the masonry. The ore is stirred and conveyed around the hearth by four rabbles fitted with stirring plates, these rabbles being connected with arms radiating from the center of the machinery pit. A current of air is forced through the arms, rabbles, etc., by a blower, which not only keeps the ironwork exposed to the heat cool, but materially assists the desulphurization. Each hearth has two fire boxes. At present we use only the upper hearth, this, with the reverberatory, having a capacity of twelve to fifteen tons of concentrates in twenty-four hours. The feed is automatic, the sulphurets are evenly distributed, stirred and conveyed around the hearth, past the two fireboxes and discharged through a slot. The sulphur contents of the concentrates varies from 35 to 40 per cent. The roasted ore as discharged carries about 1 per cent sulphur, existing principally in the sulphate condition. This is introduced into the reverberatory in ton and a half ton charges and subjected to a strong heat, until the sulphate salts are destroyed, usually in two to three hours. The roasted ore from the reverberatory is conveyed to the cooling floor, from whence it is elevated to the storage bins in the chlorination department.

The feature of our roasting works is the use of the modern mechanical furnace to accomplish by far the greater part of the work. The application of this type of furnace is not new for roasting crude ore, but it is the first instance, as far as we are aware, of its use for roasting concentrates for chlorination. It may be said here that roasting crude ore, carrying from 2 to 5 per cent of sulphur, and concentrates, containing 40 per cent, are two very different undertakings. The use of the Pierce furnace, as against the ordinary reverbatory, enables us to make a very considerable saving in the cost of labor per ton of ore. For roasting twelve tons of concentrates, one man to a 12-hour shift is employed on the turret furnace, and two men to a shift on the reverberatory, or six men all told. To do the same work by reverberatories would require four 3-ton furnaces, each employing four men, or sixteen men all told. This latter case is taken from a plant in actual, successful practice. The question of six men against sixteen in a locality where wages are $3 a day is a very important one.

The cost for repairs, wear and tear on the mechanical furnace is very slight, especially when care is taken to see that all working parts are properly set, adjusted and regularly oiled. No dust must be allowed to settle on the machinery or even enter the pit. Attention to these matters will ensure a long life to the machine. The principal wear is on the stirring blocks fastened to the rabble arms; these at the end of six months may be bent and warped so that they do not stir the ore properly and carry it forward too rapidly. We always have another set of rabbles fitted with new blocks, ready to put in position when this occurs. The rabble arms themselves last indefinitely. The current of cold air passing through them keeping them from being burnt or distorted out of shape.

The success of the application of the mechanical furnace for roasting sulphurets is very gratifying. It is a step in the right direction, and its employment in that connection is certain to extend.

The chlorination plant comprises two lead-lined, steel-shell barrels, containing 65 cubic feet of space, or large enough to hold 1½ tons of roasted ore, together with the necessary chemicals and water. Below the chlorinating barrels are placed two filter tanks, of steel, lined with lead. The filtrated solution runs into storage tanks on the next floor below, from which it is drawn off into precipitating tanks, where the gold is thrown out of the solution by ferrous sulphate solution. Sufficient water to make a thin pulp is introduced into the barrel, then a measured quantity of sulphuric acid, 66° Beaume, next a ton and a half of roasted ore, and, lastly, the requisite amount of chloride of lime. The barrel is then sealed as quickly as possible and set in motion. There is no filter or projection of any kind inside the barrel, it being a smooth-surfaced cylinder, barring the lead caps over the bolts fastening the lining to the shell. It is asserted that projections or stirrers inside the barrel exercise a beneficial effect by causing a more thorough mixing of ore and chlorinated solution. We found the per cent of extraction to be exactly the same whether stirrers were used or not. Moreover, these projections are difficult to keep in place, unless fastened under the lead lining, in which case the lead on the raised surfaces soon wears through.

In seeking for a quick, labor-saving filtering device it was decided to use an upright, lead-lined cylinder, supported on trunnions, and provided with gears and a crank, so that the tank could be inverted by hand. In the bottom a wooden filter frame is placed, over which asbestos cloth is stretched and securely fastened by a chime driven in tightly all around the frame, the cloth passing under the chime. This method of securing the cloth answers very well, we never having one tear loose. The portion of the tank containing the filter is detachable, and can be quickly taken off and replaced when it is necessary to put in a new cloth. The tank is sufficiently large enough to hold the charge contained in the chlorinating barrel and the necessary wash waters, and is provided with a cap, carrying compressed air and water connections. The filtrated solution passes out at the bottom through a rubber hose and lead pipe to the storage tanks below. At the end of three hours the chlorinating barrel is stopped, the cap removed and the contents dumped through a sluice and 6-inch rubber hose into the filter tanks. The barrel is immediately recharged and set in motion, when the workman proceeds to filter. The cap of the tank is fastened on, and compressed air and water are allowed to enter the barrel, until a test of the filtrate with ferrous sulphate solution shows no gold is present, or, in other words, that the filtration is finished. The air is shut off, the tank is filled with water, the cap removed and the tank inverted, the contents dropping into a tailing sluice leading to the dump. This method of filtering is very simple and satisfactory, and to us appears to have many advantages over sand filters in cost and time of operation. The total time consumed in filtering a charge is an hour. If necessary, it could be done in thirty minutes, by using greater pressure. The solution leaves the barrel as clear as crystal—the wear and tear on the cloth is very light. If properly put in, it will last at least six months. The gain by not having these sand filters to each barrel, three or four hours' time consumed in filtering and then removing the tailings by shoveling, tramming, etc., is obvious.

There are two chlorinating barrels, and one filter for each barrel. Four charges—two to each barrel—are made every twelve hours, one man only being employed to each shift. Six charges every twelve hours, or the full capacity of the plant, could be made as easily as four. The filtered solution flows through lead pipes into three storage tanks on the floor below. These tanks are of steel, lined with six-pound lead, and are 6 feet in diameter by 8 feet high. The solution is drawn off from a tap, 6 inches above the bottom, thus allowing space for the collection of any slimes that may pass the filter cloth.

On the next floor below are the filtering tanks, twelve in number, 7x7 feet square by 4 feet high. They are built of 2-inch plank, tongued and grooved, braced by 4x6-inch timbers, bolted together with ⅝-inch rods. All seams are tightly caulked and the whole tank painted with P. & B. paraffine acid-proof paint. This style of tank was used in preference to the usual redwood tanks, owing to the heavy cost of bringing the latter a hundred miles from the railroad. They have given much satisfaction, the loss in leakage having been very slight, and if the caulking is looked after and the seams painted from time to time, such tanks should last a long time. Except the precipitating tanks, all other appliances are of lead or lead-lined.

The method of precipitation is as follows: The solution is run from the storage tanks into a launder running over the precipitating tanks, provided with a gate and outlet for each tank. When a tank is full, eight to ten buckets of sulphate of iron solution is added. The contents are thoroughly stirred, allowed to stand for thirty minutes, when a test is made in a porcelain dish with a little sulphate solution, to see if the gold is all precipitated. If not, more of the precipitant is added. If precipitation

is complete, the tank is allowed to stand for three days, when all of the gold will be settled on the bottom of the tank. The supernatant liquor is then drawn off through two lead taps provided for that purpose, one 12 inches from the bottom, the other about an inch from it. The tank is again filled with solution, precipitated, allowed to settle, and so on until it is desired to clean up. When the tank has been drained down through the last tap the settled gold, liquor, etc., are swept out through a special tap in the bottom of the tank, into a pail. The contents of all the tanks are poured into a smaller one, 2x2x4 feet, and allowed to settle for a few hours; the liquor is carefully siphoned off and returned to the precipitating tanks. The gold remains as a thick, brown mud, which is scooped into pans, carefully and thoroughly dried, mixed with bicarbonate of soda, borax glass and silica, and melted in graphite crucibles. The resulting bars run from 980 to 995 fine.

Filtering and washing the precipitate may be dispensed with if sufficient time for settling is allowed when the mass is in the cleanup tank. Much time is thereby saved, the cleaning up of twelve tanks, containing $7000 or $8000, having been accomplished in twelve hours. When the precipitate is filtered and washed the bars run over 990 fine; when this is not done the average fineness is 980.

In all cases it is advisable to allow the liquor withdrawn from the precipitating tanks to drain through a sawdust or sand filter, as a precaution that no gold left in suspension may be left. Great care must be taken to always keep the chloride of lime in a cool, dry place. If it becomes damp it is almost useless, and causes much trouble and annoyance.

The proportion of chemicals used is nine pounds of chloride of lime and eleven to twelve pounds of sulphuric acid per ton of ore. The average extraction of the values in the concentrates has been 95 per cent since the starting of the plant.

The superintendence of the operation should only be left in the hands of a man trained in the chemistry of the process. Many things occur upsetting the line of procedure laid down by an installing engineer, that are really simple and easily remedied, but puzzling to the ordinary mill man.

There is no doubt that the applicability of the chlorination process to many ores and classes of concentrates is constantly becoming better known, and its use will be extended, especially when it is more universally understood that such plants as described are built only to save cost of working in treating comparatively large quantities of material. Small mills can be erected very cheaply, built entirely out of common lumber; furnaces may be constructed out of rock, stones, etc., which will answer the purpose very well indeed.

A comparison of working costs of this method of chlorination with the Plattner process, as now carried out, may be of interest:

2 Turret roaster men at $3	$ 6 00
4 Reverberatory roaster men at $3	12 00
6 Cords of wood at $2.25	13 50
2 Barrel men at $3	6 00
1 Tank room man at $3	3 00
90 Pounds of chloride of lime at .05	4 50
110 Pounds of sulphuric acid at .04	4 40
Wear and tear, repairs, oil, etc.	5 00
Total	$54 50

40.54÷12=4.54.

Figured on twelve tons of concentrates per twenty-four hours, equivalent to ten tons of roasted ore, the cost per ton is seen to be less than $5. The average cost of chlorinating a ton of sulphurets throughout California and Alaska is given in the latest reports at $8.

The New Forest Reservations.

Written for the MINING AND SCIENTIFIC PRESS by JOHN MUIR.

Uncle Sam is trying to save his forests—what is left of them—and at the same time trying to find out how best they can be put to use and kept in use forever for the benefit of miners, farmers, lumbermen and the people in general. But the problem, though simple looking enough in theory, is a very difficult one on account of widely varying conditions and interests, and the general apathy and blindness of those whose interests are not immediately involved. In the meantime the demands made on the forests for timber grow heavier every year, while the area of the forest lands is rapidly being diminished and all kinds of waste and destruction go on, not only unchecked but with accelerated speed.

Running fires consume probably from five to ten times as much timber as the axe, even under present wasteful methods of lumbering, and as new settlements are made and the woods are more generally invaded these fires, of course, become more frequent and destructive. It needs no prophet, therefore, to see that unless protective measures be speedily invented and applied our magnificent forests, once thought inexhaustible and as little in need of protection as the ocean, will in a few decades be utterly destroyed.

On the Atlantic slope and in the middle West much of the land was cleared for farms, the soil being fertile, and bread, rather than timber, being required; but very little of the remaining forest lands are fit for agriculture, and when cleared become desolate and give rise to floods. At present most of the forest-bearing lands still belonging to the United States are in the great mountain chains of the West. Some of these, on the Coast ranges facing the ocean, are comparatively free from fire on account of copious rainfall, but the Rocky mountain region is dry and is swept every summer by tremendous fires. The timber is inferior, but of vast importance, nevertheless, covering, as it does, the fountains of our great rivers and supplying the mines of this rich mineral region and the farms in the adjacent lowlands.

Every interest demands a new departure in the Government's management of its forest property. As Mr. E. A. Bowers, formerly inspector of public lands, well says, "the time is ripe for the introduction of some intelligent policy. Some of the very men who have been the devastators of our finest forests begin to see the folly of their course, and fear that soon there will be no material for the lumber trade. They are ready and willing to pay the Government a reasonable price for timber which can be properly sold, and aver that some system by which they can cut timber under authority of law is a necessity. The more intelligent pioneers of the arid regions realize that the regular flow of the streams throughout the whole season, furnishing water for irrigation through the summer drouth, is changing into torrents of a few weeks' duration in the spring which carry destruction by their flood and wash away the fertile soil, and then suddenly subside and disappear when most needed."

Thus settlers, lumbermen and miners alike call out for reform, and the reform required is now being earnestly and thoroughly studied by the Forestry Commission appointed by the National Academy of Sciences at the request of the Secretary of the Interior. Under skilled management, something like what obtains in European countries, a perennial harvest of timber may be drawn from the woods sufficient for every need, and to spare, without diminishing their area, leaving them as beautiful as before, and as fruitful, with all their beneficent influences of every kind unimpaired.

As a foundation for such a system, it was at once seen that all the forest-bearing lands not more valuable for agriculture than for timber should be withdrawn from sale and held together by the Government in the public domain. Accordingly, as a preliminary step, on the recommendation of the Commission, twenty-one million acres in the West were reserved, in addition to some seventeen million acres formerly reserved by Presidents Harrison and Cleveland.

Then out of the West, the very region most to be benefited by a rational policy, came a storm of objection and protest. "All the resources of our States are being withdrawn from use;" "All our forests are to be made into pleasure grounds for wild animals and dawdling sentimentalists," they cried. They then claimed that all settlers were to be ejected from the reservations; that no search for minerals would be allowed, etc., which, being interpreted, is, "Let good old ruin go on and a few quick dollars be caught." If this were the voice of the people, the fair expression of public opinion, then good-bye forests. But we are far from believing it is. This sort of protestant seldom speaks in his own name, but usually in the name of his poor neighbor, while the great corporation and the free grabbers in general are kept out of sight in the background. One person with a thousand dollars directly at stake will complain more and fight more on a public question like this than a thousand men whose interests are only indirect and out of sight.

But things refuse to be mismanaged long. Light is beginning to bring the question into a fair view, and the policy of use without destruction and fair play to all must win at last.



SITES SANDSTONE QUARRY, COLUSA COUNTY. (See page 277.)



GOODRICH SANDSTONE QUARRY, SANTA CLARA COUNTY.

Simple Ore Tests.

The following simple tests will show whether an ore carries any precious metals. Afterwards samples of the rock should be assayed to ascertain the amount of value per ton:

Gold—Powder; roast if sulphurets are present; grind very fine and wash in pan or spoon; examine with lens; yellow particles not soluable in nitric acid. The color of pure gold is bright yellow, tinged with red. Gold may be distinguished from all other metals or alloys by the following simple traits: It is yellow, malleable, not acted upon by nitric acid.

Silver—Pure silver is the brightest of metals, of a beautiful white color and rich luster.

Chloride of Silver—If suspected in a pulp, harshly rub a bright and wet copper cartridge thereon. If a chloride or chloride-bromide of silver, it will whiten the copper. Graphite will thus whiten copper or gold but can be rubbed off.

Copper—After roasting the pulp, intimately mix and well knead with a like quantity of salt and candle grease or any other fat, and cast into the fire when the characteristic colors—first blue, then green—will appear. This test is better made at night.

Galena—Black zinc blend is often mistaken for galena. The two may be distinguished by the infallible sign: the powder of galena is black; that of blende, brown or yellow.

Scientific Progress.

Rising and Lowering Continents.

The rapid rise of the land about Hudson bay is said to be the most remarkable gradual upheaval of an extensive region ever known. Driftwood covered beaches are now 20 to 50 or 70 feet above the water, new islands have appeared and many channels and all the old harbors have become too shallow for ships. At the present rate, this shallow bay will disappear in a few centuries, adding a vast area of dry land or salt marsh to British territory in America.

The erosion of the earth's exposed portions assumes rather serious importance when we are told, as in Dr. John Murray's latest lecture, that the continents will entirely disappear in about 6000 years if the present rate of washing away continues. The average height of the continents above sea level is now about 275 feet. The average depth of the sea is something like 13,000 feet, and its volume is so great that, if all the land of the continents were leveled off, the earth's surface would be an unbroken ocean two miles deep. The greatest ocean depth yet found is 5155 fathoms in the Pacific, off the Kermadec islands. The continental deposit of mud does not extend outward beyond a depth of 100 fathoms, and all is contained within a distance of 300 miles, this great mud belt being the feeding ground of the ocean. It seems almost certain that sunlight does not penetrate beyond about 100 fathoms—a belief confirmed by the total absence of plants at greater depths. There are no currents and very little motion of the water below 100 fathoms, all being blackness and stillness—an abyss of gloom appalling to the imagination. The darkness is relieved only by the phosphorescent lamps of the strange organisms which live at the bottom and feed on the organic particles precipitated from the upper waters. A feature of the deep-sea fish is that they contain very little bony substance or carbonate of lime. Dr. Murray thinks that life gradually found its way into the ocean from the continents, and that the farther away from land it got the more archaic it became in form.

The First English Armor Plate Rolling.

In a sketch of the life work of Sir John Brown, the eminent English iron and steel manufacturer, *The Engineer* gives the following account of the first armor plate rolling in England:

"It is Mr. Brown's custom to go on the continent every autumn. In 1860, on his way home, he returned by Toulon. There was no little commotion in the place that day. The French ship La Gloire had put into the harbor. This ship was a wooden 90-gun three-decker. The French had cut her down into a sort of magnified corvette, armed her with forty heavy guns, and clothed her with hammered iron armor 4½ inches thick; the plates were each five feet long and two feet wide. This 'new departure' in men-of-war put our admiralty in a fever. Ten 90-gun and 100-gun timber-built ships were at once stopped in their construction, the intention being to make them so many British editions to the French craft. Sir John tried to get on board the ship. He was not allowed. Inspecting the vessel very closely through his glasses, his quick eye detected that the hammered armor had a cobbled look, rough, like a rubble wall. He felt sure he could do better than that. Convinced that he could roll a plate superior to anything that could be hammered, he went back to Sheffield and set to work. He put down a rolling mill, and experimented incessantly until he achieved his purpose. At a meeting of the Institution of Mechanical Engineers, Sir John read a paper, in which he gave a description of the method of rolling a five-ton armor plate. As the first authoritative account of armor-plate rolling in England, an extract is worth preserving. Here it is: Several bars of iron were rolled twelve inches broad by one inch thick and were cut thirty inches long. Five of these bars were piled and rolled down to another slab, and these two slabs were then welded and rolled down to a plate 1½ inches thick, which was sheared to four-feet square. Four plates like that one were then piled and rolled down to one plate, measuring eight by four feet and two inches thick. Lastly, four of these were piled and rolled to form the final and entire plate. There were thus welded together sixteen thicknesses of plate, each of which was originally one inch thick, to form one plate 4½ inches thick, being a reduction of thirty-five times in thickness, and in the operation from 3500 to 4000 square feet of surface had to be perfectly welded by the process of rolling. Even with the greatest care it was not surprising that blisters and imperfect welding should occur and render the plate defective. This was the chief difficulty to be overcome, and it increased with the magnitude and weight of the plate, the final operation of welding the four plates, measuring eight by four feet and 2½ inches thick, being a very critical one. The intensity of the heat thrown off was almost unendurable, and the loss of a few moments in the conveyance of the pile from the furnace to the rolls would be fatal to success."

Earthquake Knowledge.

Earthquake science, which attracts little attention in the United States, has made great strides during the last few years. Prof. John Milne observes that only very recently an earthquake was looked upon as a transient phenomenon lasting a few seconds, or at most two or three minutes, while now, by the aid of the seismograph, it is possible to discover and record all the tremors preliminary to and following an earthquake. From his residence in the Isle of Wight, Prof. Milne was last year able to take records of two of the most destructive earthquakes in Japan, and in one case to predict that the occurrence of an earthquake at a certain time in Japan would be reported, the only inaccuracy in his prediction proving to be an error of one minute in time. The earthquakes now recorded in Japan, which is pre-eminently the land of such phenomena, now exceed 1000 a year. Seismology is being taken up in that country with great eagerness, making it certain that earthquake study throughout the world will be revolutionized very soon, and the Japanese have already profited by the work done to the extent of entirely altering the character of their buildings, and thus greatly reducing the loss from earthquakes. A committee of the British Association for the Advancement of Science is seeking co-operation in an effort to extend and systematize the observation of earth movements.

A MARVEL of geology that has remained strangely unknown is possessed by Greece at Argostoli, in the island of Cephalonia. At this point four currents of water set in from the sea and sink into the limestone of the cliffs, giving an anomalous water power that in the middle of the century was used for driving two grist mills. The fall from sea level to the surface of the discharge pits is 3 feet to 5 feet. Allowing a flow of 2000 cubic feet per minute to be necessary to drive the mills, Profs. F. W. and W. O. Crosby find that the annual consumption of water must have been 2,000,000,000 cubic feet, which would fill a chamber about five miles long, 1000 feet wide and 75 feet deep. As the flow seems to have been uninterrupted and fairly uniform for a century, perhaps for many centuries, it cannot be assumed that the water is simply filling a fissure. Other theories—such as evaporation in the porous rock or on encountering volcanic fires—are also unsatisfactory, and Profs. Crosby have reached the new conclusion that the water returns to the surface after being heated, the difference in density between the cold water entering the underground channel and the warm water emerging being sufficient to account for a difference in height that would enable the warm column to empty into the sea while the cold column is depressed below sea level.

Heat of the Sun.

Estimates of the sun's temperature have ranged from 18,000,000,000 degrees down to 3000 degrees Fahr. At the Moscow observatory, Prof. Ceraski has repeated the old experiment of measuring the heat of direct sunlight at the focus of a mirror, the mirror in this case being very accurately made and having a focal length of about 39 inches. The result was 3500 degrees C. (6300 degrees Fahr.), showing only that the solar temperature is greater than this. A measurement of the heat reflected from an arc lamp was then made, the temperature in the focus of the mirror proving to be only 100 degrees to 150 degrees C., although the arc itself was known to have a temperature of very nearly 3500 degrees. From this it is argued that the temperature of the sun must be very much more than 3500 degrees, while it is believed that this method may lead to an accurate estimate.

Electrical Progress.

Instruments for Fine Measurements.

In electrical work minuteness of measurement has been obtained. At the recent New York Electrical Exposition a meter was shown which would measure a current of 88,000 amperes. Lord Kelvin devised an instrument, which, as now perfected, will measure a current of one fifty-four millionths of an ampere; and such a current as is formed by dipping the tip of a brass pin and of a steel needle, connected with the galvanometer, into a drop of salt water, will cause the needle to swing clear across the scale. The radio-micrometer constructed by Prof. Vernon Boys, is so delicate that it will detect and register the rise of temperature through one-millionth of a degree. This extraordinary device will measure the radiant heat given off by a candle flame two miles away! It is merely a loop of wire suspended by a delicate quartz fiber between the poles of a magnet, the circuit being closed by a piece of antimony and a piece of bismuth soldered to a minute disc of copper foil. Similar instruments have been constructed to measure a microvolt ($\frac{1}{1000}$ of a volt) and the resistance of the one-millionth of an ohm. A mile of No. 10 copper wire has a resistance of about an ohm.

The figures and comparisons convey no very vivid idea of the micro-cosmic world into which they penetrate. By means of defraction gradings, that is, fine lines ruled upon glass—and it is possible to rule these as high as 120,000 lines to the inch—fractional wave lengths so infinitesimal that 2,500,000 of them laid alongside of each other would only make an inch, can be detected. Supposing that it were possible to draw out the little gold dollar of our currency into a wire one-twenty-five-hundred-millionth of an inch in diameter (one-two-and-a-half-billionths), that wire would be long enough to stretch to the sun and back again 10,000 times.

Reaching to such an extreme degree of tenuity, it would seem as if the groping physicist might be somewhere near the fundamental mystery of the constitution of atoms and molecules; and yet that mystery would be still locked in every infinitesimal portion of this minute wire.

Polarization of Electric Rays.

Prof. J. Chunder Bose of Calcutta recently lectured before the Royal Institution in London on "The Polarization of the Electric Ray." He described the apparatus designed by himself for experimenting with electric waves, by means of which, he said, experiments in electric radiation could be carried on with as much certainty as could experiments with ordinary light. He performed experiments illustrating the number of properties possessed in common by light waves and electric waves. He exhibited the power of selective absorption to electric rays displayed by many substances, pointing out that while water, for example, which was a conductor, stopped them, liquid air, which was a bad conductor, was quite transparent to them. He showed that various crystals could polarize electric rays just as they did ordinary light, and proved that substances under pressure and strain could produce double refraction in them as did glass under the same conditions in light. Tourmaline, he said, was useless for electric rays, but a lock of human hair was extraordinarily efficient, and ordinary jute formed a good polarizer.

Magnetism and Light.

Zeeman, of Amsterdam, has recently discovered a curious influence exercised by the magnetic field upon the period of light emitted by a flame. He introduced into an oxyhydrogen flame, placed between the poles of a Ruhmkorff's electro-magnet, a filament of asbestos soaked in common salt. The light of the flame was examined with a Rowland's grating. Whenever the circuit was closed, both D lines were seen to widen. To eliminate possible sources of error in this experiment, another experiment was made by heating sodium strongly in a tube of biscuit porcelain, closed at both ends, by plane parallel glass plates. The tube was placed horizontally between the poles of the magnet, at right angles to the lines of force. The light of an arc lamp was sent through. The absorption spectrum showed both D lines. Excitation of the magnet caused immediate widening of the lines. It thus appears very probable that the period of sodium light is altered in the magnetic field.

Zeeman considers that the true explanation of these results is afforded by the theory of electrical phenomena propounded by Prof. Lorentz. According to this theory, there are in all bodies small molecular elements charged with electricity, and all electrical processes are to be referred to the equilibrium or motion of these "ions." Zeeman considers that in the magnetic field the forces directly acting upon the ions suffice for the explanation of the phenomena. Prof. Lorentz, when consulted on this subject, predicted that the light from the edges of the widened lines would be found to be circularly polarized when looked at in the direction of the lines of force; and, further, that the magnitude of the effect would lead to the determination of the ratio of the electric charge which the ion carries to its mass. These predictions were verified by experiment.—London Electrical Review.

Compound and Shunt Wound Generators.

The successful operation of stations for electric lighting and power depends largely on the automatic regulation, not only of the speed of the prime movers, but also of the E. M. F. of the generators. In both of these essential features the last few years have brought forth marked development, in consequence of which we are now enabled to install plants for electric lighting and power, in which the speed of the engines will not vary more than 1½ per cent from the normal, when the full load is suddenly thrown on or off, while the builders of dynamo machinery can and do supply us with generators which are almost absolutely self-regulating as to E. M. F. A modern constant potential generator will not only compensate automatically for the variable losses due to armature reaction and internal resistance, but it can be made to give an E. M. F. at the brushes which, under varying conditions of load, will be such as to compensate not only for the variable losses in the machine itself, but also those due to the resistance of the external circuit.

The success which has thus been attained in the automatic regulation of

constant potential generators is largely due to the careful study and application of compound winding; and while but a few years since nearly all of the large stations were equipped with plain shunt-wound generators, we find that these have now been superseded by the compound-wound type in almost every class of service.—Journal Franklin Inst.

Mechanical Progress.

A Sidereal Clock.

The sidereal clock at the Greenwich Observatory is in an underground room called the magnetic basement, where it ticks its seconds as prescribed by the "clock" stars. This reference to the "clock stars"—fixed stars, slightly over two hundred in number, which are used in determining sidereal time, brings up the transit circle, the most important instrument in the observatory, and one of the most interesting. It consists of a large telescope, the outside of which is not unlike a great cannon, as it is of solid iron. It is supported by trunnions, which allow the telescope to be elevated or depressed, to point north or south, and to make a complete revolution, but never to diverge from the north and south line. The magnifying power of this instrument is not very great, but its field of view is large, so that it admits plenty of light, for it is not intended as a searcher after or for gazing at celestial objects, but for noting the exact time at which stars and planets pass south and north of Greenwich. Upon looking through this telescope is noted what seems to be a vertical row of iron bars placed at equal distances from each other. They are, however, spiders' webs, the center one, passing through the focus of the object glass, being the meridian line. By observing the time at which the "clock stars" pass over these web lines, or "wires" as they are called, is sidereal time regulated. The adjustment of the instrument has to be extremely exact in order to obviate error. The slightest thing will put it out, even so small a matter as too much sunshine.

On one occasion the correction for a level error in the instrument having become inconveniently large, owing, apparently, to a subsidence of the eastern support, about a ton weight of stone was placed on the western pier. But this having no effect, the stones were removed and a sheet of very thin paper was placed under the support on the eastern side, by which means the error was corrected.

To Shut Off Steam Instantly.

It sometimes happens in a large factory, run by steam power, that a man gets caught in the belting, some tool drops into a machine, a shaft is broken, or some other accident happens which renders the instant stoppage of the engine desirable. In the few minutes required to pass the word along to the engineer a life may be lost, or machinery may be damaged to the extent of hundreds, perhaps thousands, of dollars. To cope with situations like this a device has been invented to be attached to the engine itself, but actuated instantly by an electric wire from any part of the building. At various convenient stations the wire is provided with a button, like those commonly used on electric call bells. So long as the buttons are let alone, nothing will happen, but if any one of them be pressed for the tenth part of a second, that operation will immediately shut off steam. The current in the wire, when the button is pressed, energizes an electro-magnet on the engine, and the attractive power of the magnet throws up the arms of the governor and shuts the valve admitting steam to the engine. This electric apparatus can also be made to work automatically with a slight increase of speed in the engine, and thus prevent racing, bursting of flywheels and other mishaps. The *Tribune* says the invention has been fully tested, and is now about to be manufactured for the market in Springfield, Mass.

THERE have been built in the United States in 1896 33,000 cars more than the total of two years ago, yet the total is still below the lowest of any year before 1894, for which we have figures that are comparable. These go back to 1888, and the lowest total in that period is in 1893, when 56,900 cars were reported built, or about 6000 more than in 1896. But one of the large companies, whose output is included this year, did not report in 1893, so that the difference is actually larger. Comparing with 1890, the best year for car building in the last decade (the best for locomotive builders also), we find that the 1896 output was not half that of the earlier year, when 103,000 cars were built. In both 1891 and 1892 also the contracting shops turned out within 4000 of 100,000 cars.

HAMMERS are represented on the monuments of Egypt, twenty centuries before our era. They greatly resembled the hammers now in use, save that there were no claws on the back for the extraction of nails. The first hammer was undoubtedly a stone held in the hand. Claw hammers were invented some time during the Middle Ages. Illuminated manuscripts of the eleventh century represent carpenters with claw hammers. Hammers are of all sizes, from the dainty instruments used by the jeweler, which weigh less than half an ounce, to the gigantic fifty-ton hammer of ship-building establishments, some of which weigh as much as fifty tons and have a falling force of from ninety to one hundred. Every trade has its own hammer and its own way of using it.

IN England much attention is given to shorthand, especially for reports for newspapers. It is quite the rule that every man connected with a newspaper, as an editor or reporter is a trained writer of shorthand, an accomplishment made necessary by the practice of printing very full reports of speeches delivered in Parliament or on the platform. It has not yet come into anything like universal use, as with us, for business correspondence, but is growing into popularity since the typewriting machine began to make its way; neither is it employed in courts of law for taking verbatim reports of testimony, this duty being still assumed by the judge, in accordance with old-time usage.

R. T. PAINE, of Boston, on March 9th, on a train on the Philadelphia, Wilmington and Baltimore Railroad, broke all previous records between Washington and Wilmington. Mr. Paine's wife was dying in Boston, and Mr. Paine chartered the train in Washington at $2 per minute, and offered a bonus for every minute clipped off the record. The distance between Washington and Philadelphia is 135 miles, and it was covered in 132 minutes. Two three-minute stops were made to cool journals. It took the train but 30 minutes to make the 34 miles between Perryville and Wilmington.

IN the trial of the compressed air motors on 125th Street line in New York, the cars have made regular daily trips for nearly eight months, have successfully completed a total mileage of 23,183 miles, and carried about 138,650 passengers. An accurate account has been taken of the daily consumption of air, as well as the consumption during each trip, and the motors have demonstrated, not alone their practicability, but also their economy.

THE longest turntable in the world was completed recently at East Albany for the New York Central. It is intended not only for locomotives, but for sleeping and long private cars. It is 68½ feet in length, and its construction required 431 yards of concrete in the center of the table. As evidence of how nicely it is adjusted, a boy fourteen years of age turned one of the company's heaviest locomotives on it with but little effort, so perfect is its mechanical adjustment.

Practical Information.

Economic Value of Fruit Stones.

The seeds or stones of many fruits which would apparently seem useless have some economic value, and in this connection we are speaking chiefly of those which are often thrown away. In certain parts of Egypt the date stones are boiled to soften them, and the camels and cattle are fed upon them. They are calcined by the Chinese, and enter into the composition of their Indian ink. In Spain they are burnt and powdered for dentifrice, and vegetable ivory nuts are applied to the same purposes. Some species of Attalea nuts are burned in Brazil to blacken the raw caoutchouc or india-rubber. The seed or stone of the tamarind is sometimes prescribed in India in cases of dysentery as a tonic, and in the form of an electuary. In times of scarcity the natives eat them after being roasted and soaked for a few hours in water; the dark outer skin comes off, and they are then boiled or fried. An oil has been obtained from this seed. The seed of the carob bean is ground up as food for cattle, and is used in Algeria, when roasted, as coffee.

THE new Panama Canal Company, which is now said to be quietly but steadily working upon the construction of a lock canal, was organized in Paris on October 1, 1894, just in time to save the concession from Colombia, which expired on October 31, 1894. Stockholders subscribed $4,000,000 toward the work, and from some of the thieving promoters of the old company a further sum of $3,400,000 was forced. The report of the Commission of Dutch, Belgian and French engineers, submitted in May, 1890, estimates that a lock canal could be built for $180,000,000, including interest on the investment and 20 per cent for contingencies. The estimated traffic was 1,000,000 tons for the first year and 6,000,000 tons twelve years after the opening of the canal. The latter amount would yield $12,250,000 annually in net tolls, which would be about 25 per cent higher than the tolls on the Suez canal. The estimated value of work done and plant on hand was $90,000,000. The United States of Colombia has granted a further concession extending the time of completion to 1904. Under the present administration it is claimed that the strictest economy is being practiced and the latest devices for cheaply handling earth and rock are being introduced.

THREE useful things to have in the house as a provision in case of wounds not sufficiently serious to necessitate a doctor, are a spool of adhesive plaster, some iodoform gauze and a package of carbolated absorbent cotton. Cleanse and dry as nearly as may be the cut surface with a wad of the cotton, using moderate pressure, and elevating the part if necessary to check the flow of blood. Do not apply any water. Bring the cut surfaces together as accurately as possible and retain them there with as few and as narrow strips of the plaster as will suffice, cutting them of a good length. Then cover the wound with a dozen or so thicknesses of the iodoform gauze, which should extend an inch beyond the wound. Over the gauze apply a liberal layer of the absorbent cotton, allowing it to extend beyond the gauze. The cotton may be kept in place by a bandage, or a part of the leg of a stocking may be drawn over it. Moderate pressure, if evenly distributed, is helpful. The pressure of a string is hurtful. Keep the part moderately elevated and take care that there is no constriction of the limb above the wound.

RUSSIA has under consideration the establishment of a gigantic waterway from India to St. Petersburg. From the confines of Afghanistan, this route would pass by the Amou Darya, and across the Caspian sea to reach, by way of the Volga and the Marie river system, the capital and the Baltic. The whole project depends on the possibility of diverting anew the waters of the Amou Darya in their ancient bed, leading to the Caspian. After the occupation of Krasnovodsk in 1869, and the capture of Khiva in 1873, a number of expeditions were sent into the Turcoman Steppes to examine the ancient beds of the Amou Darya. After Lieut. General A. Glonkhovskoi's five years of unceasing labor, the expedition reported in favor of the restoration of the ancient bed of the majestic Amou Darya, which would restore their ancient fertility to the oases of the country, and, by re-establishing the irrigation of the Turcoman Steppes, would procure for the whole region abundant crops. The establishing an unbroken river route from the Baltic to Afghanistan would open up to Russia at the same time the markets of India, which are up to the present inaccessible, and would assure for the whole world the shortest road, by the Caspian sea and Russia, by which the commerce between the richest country of Asia and the States of Europe would largely benefit. Last August a new expedition under the same direction was sent, on the initiative of the Government, to the valley of the Amou Darya, with the object of ascertaining what changes had taken place in the course of the river since 1884, and also in its minor channels, so that the new question of the best direction for the course of the river might be settled.

THE practice of woman changing her name on marriage originated from a Roman custom and came into use after the Roman occupation. Thus, Julia and Octavia, married to Pompey and Cicero, were called by the Romans Julia of Pompey, Octavia of Cicero, and in later times women in most countries signed their names in the same way, but omitted the "of." Many persons think that the custom originated from the Scriptural teaching that husband and wife are one. This was the rule of law so far back as Bracton, and it was decided in the case of Bon vs. Smith in the reign of Elizabeth that a woman by marriage loses her former name, and legally receives the name of her husband. The custom, however, is not universal. In Spain and Portugal married women do not take the names of their husbands, but continue to be known by their own. In many parts of the United States a woman never relinquishes her maiden name, and is called by it as often as by that of her husband. Even in the rural parts of England one often finds a married woman called by her maiden name, and in country districts of Scotland it is sometimes found that both names are used. In many parts of France and Belgium the husband's and wife's names are used together when either of them is used.

TO ASCERTAIN whether or not a room is damp, a pound of fresh lime should be placed therein, after hermetically closing doors and windows. In twenty-four hours it should be weighed, and if the pound has absorbed more than 1 per cent of water, the room should be considered damp and classed as unhealthy. The question of the dampness of dwellings is a frequent cause of dispute between landlord and tenant, and is naturally solved in the negative by the former. The question can be settled by the test of the hydration of lime, which will give irrefutable proof of the validity of such complaint.

GOOD sandpaper will not crack when folded double, and, when the sanded surfaces are rubbed together, an idea of the quality may be obtained by observing how readily the particles of sand are detached. Sandpaper should always be kept in a dry place. If the back of the paper is chalked, it will prevent its slipping when using.

THE Sahara is not a barren and worthless waste. Some time ago there were 9,000,000 sheep in the Algerian Sahara alone, besides 2,000,000 goats and 260,000 camels. On the oases there are 1,500,000 date palms.

Mining Summary.

CALIFORNIA.

Amador.

Republican: At the Anita at the depth of 500 feet drifts have been run on the ledge north and south. The south drift has followed the ore body for 80 feet from the shaft. The north drift is in ore for 200 feet. The length of the chute at this level is 250 feet, the width ranging from 3 to 8 feet. A portion of this ledge is high-grade ore. The average of the ledge in its entire length and width is estimated at $6 per ton.

At the Alma they have been running a drift east at the 1000-foot level to tap the ledge. The ore was penetrated some months ago by the diamond drill, the drillings showing a 6-foot ledge of good quality. The regular drift has been extended 100 feet from the shaft. In the early part of the week an abundance of water was tapped, indicating that the fissure is close by.

The McMahon, east of the Zeile, is being prospected under a bond secured by T. H. Rooney. Last week a quartz ledge was encountered at the depth of 100 feet.

The Oneida shaft is down over 800 feet and making rapid progress.

The new 40-stamp mill of the Baliol Mining Company, operating the old Maximilian mine, east of Sutter Creek, was started last week.

Ledger: A. Saullan, who has been prospecting on the property west of the Alma, intends to reopen the incline and sink 100 feet this spring.

The Union Consolidated will prospect their ledges at the 500-foot level. They propose to run east to the gouge ledge, about 130 feet, and west to the Paugh, about 600 feet.

J. F. Parks, representing the company operating the Kennedy, has been trying to get a four-year bond on the Good Hope mine, and to pay $75,000 therefor if it should prove to be a profitable investment after development work has been done. The principal owner, Mr. Peters, refuses to accept the proposition. The work of sinking has been resumed.

Record: Ore is being hauled from the Argonaut to the Zeile mill. Grading is being done for a 40-stamp mill, which will be erected as soon as the weather settles.

The Bay State mine in Plymouth district suspended operations a couple of weeks ago. It is understood to be the intention to resume work again in a short time.

Butte.

Mercury: At Forbestown Mr. Antram has put his mining property into the hands of the Pacific Mining Improvement Company for development. They have a 12-foot ledge, the ore low grade, but it is proposed to build a 100-stamp mill.

Charles Webb Howard of San Francisco, who has had a bond on the Dannebroge and and Pennsylvania mines in Brown's valley, has complied with the conditions of the bond, and is now the real owner of those claims. The consideration was $35,000 for the Dannebroge and $4000 for the Pennsylvania. N. D. Rideout was the seller of the Dannebroge. F. W. Page is Mr. Howard's general manager.

El Dorado.

(Special Correspondence). — San Francisco parties have purchased 160 acres of gravel property upon which a mill is to be erected within a short time; active work will be commenced in a few weeks. The property is within five miles of town.

At the Union mine the work of running a tunnel is progressing rapidly. The distance run is 250 feet. It is expected that the ledge will be cut at another 250 feet. The property is a portion of the old Church Union, eleven miles southwest of town, and is operated by Judge George E. Williams.

At the Omo mine, twenty-five miles east of Placerville, one tunnel has reached 140 feet, and a lower one has reached 300 feet, both on a 6-foot ledge of $10 ore. A 5-stamp mill is just completed and within a few weeks the plant will be in full operation.

New life is coming into the famous Indian Diggings gravel mines which were rich producers during the days of hydraulic mining. Men are working the tailings through sluices and netting from $3 to $5 per day.

Placerville, March 30th, '97.

Fresno.

Republican: Several new prospects on Kings river, in the vicinity of Trimmer's Springs, are reported. Among the most promising is the Bowers lead, which is reported to have been bonded for a large sum recently. A number of other prospects also promise well. Great interest is being taken by the prospectors, and it is believed that the attention of capital will soon be attracted to that locality. The ledges are all very large.

Inyo.

Register: At Darwin work is still progressing at the Lane mine, now owned by the Inyo County Mining and Development Company. The force has been increased to fourteen men. The new shaft is down nearly 600 feet, with plenty of high-grade ore in sight, enough being taken out to keep a team hauling on an average of fifteen tons to the trip each four days. Besides which the company is doing a lot of dead work, and have two men employed opening up the Lane Spring, in the Darwin Wash.

The Bryan mill, at Montgomery Bros.' camp, was started last week. About twenty-five men are employed at the camp.

Hannaberry & Kern speak of putting up a mill on their claims in Jail canyon.

Panamint district seems to be having a big boom, as the roads between Panamint and Randsburg are lined with teams. New towns are also springing up, one being laid out at Post Office Springs, and one with the handle of Ballarat, a mile and a half north of Post Office, has one hundred inhabitants.

Kern.

Californian: There is decided interest in and about Havilah, in the mines. Several are being developed which show flattering results. Keysville is having a small boom of late. The mines there are turning out good ore.

From all indications Piute mountain will have a boom. There are large, well-defined ledges, and many minor ledges from 1 to 3 feet, that bear very rich quartz, and the miners are patiently waiting for the snow to disappear to resume work.

A stamp mill is to be built on the Surplus mine, there being sufficient ore in sight to keep a mill running for some time, and it is of a high grade.

The Amalie Mining Company are running their mill daily with good results.

H. W. Blaisdell is coming back to Havilah to resume operations in the mines there.

Kern and San Bernardino.

(Special Correspondence).—The activity in mining circles which has characterized the past year has not abated. At Virginia Dale, Randsburg, Kramer, Needles, Providence, Picacho and other points a great amount of businesslike development work is being done, and in each of the camps above mentioned there are from one to half a dozen mines that are paying very well. At Randsburg the town lot boom which held sway in the bustling camp a few weeks ago has entirely subsided, but there is no decrease in the number of inquiries for safe mining propositions. It is expected a large force will soon be put on to work the Rand group of mines, and Reddy, one of the owners, says a 20-stamp mill will soon be put in at the foot of the incline, five miles from the mines, where a water supply can be easily obtained. In this camp are many idle men, who came expecting to secure employment. There is a shortage of capital and an excess of workmen in all that section.

San Bernardino, March 29th, '97. G.

Nevada.

Transcript: The steam pump ordered for the Summit mine has arrived and is being placed in position with all possible haste. It will pump from the shaft at the rate of 400 gallons of water every minute, which with the other pump already at work will probably free the mine of water down to the 300 level in a week. The water has risen in the shaft 280 feet and was still rising. It is not known whether the water comes from a large underground waterway or is an indication that a big ledge of quartz is not far from where the body of water was tapped by the machine drills.

Union: In the California mine Supt. Dana Harmon has the tunnel now in 1640 feet and it is calculated to strike the vein when the tunnel is pushed ahead another 150 feet. This will give about 600 feet of backs, and will be the deepest working ever done in that section of the county.

Placer.

Sentinel: The New 5-stamp mill at the Mountain Maid quartz mine is now running day and night. This mine is located near You Bet. The main tunnel is in about 400 feet on the ledge. A crosscut has been made showing a width of 25 feet for the ledge without having either hanging or foot wall. At the end of the main tunnel they have 150 feet of backs. By sinking on the ledge to the level of Bear river the backs would be increased to 500 feet. The ledge contains streaks of high-grade ore, but as the entire ledge matter is run through the mill it makes a low-grade proposition. The rock is dark, almost what might be called a porphyry dike, and is such that two men in the tunnel more than keep a 5-stamp mill running.

The French Hill quartz mine in Spanish Dry Diggings district, near Butcher ranch, has been sold to J. H. Galey of Pittsburgh Pa., for $40,000. The mine was the property of State Printer A. J. Johnston, and the sale was negotiated by Col. W. R. Wallace of Auburn. Mr. Galey is a large stockholder in the Standard Oil Company. A 10-stamp mill is on the ground and a concentrator has arrived at Auburn. The ledge is about 40 feet in width and prospects well in free gold. The sulphurets are rich.

At a depth of 260 feet in the Occidental mine at Grizzly Flat gravel has been encountered. Supt. Wm. Cameron expects to reach bedrock by sinking the shaft 60 feet farther. The Occidental adjoins the Morning Star mine.

At the quartz mine on the old Brokaw place, east of Auburn, purchased from C. F. Reed by James E. and John T. Walsh, a perpendicular shaft is being sunk. Some weeks ago these gentlemen took nearly $1000 from a rich stringer.

One-half interest in the Bell Union mine has been sold for $4000 to P. A. Hart. The mine is owned principally by H. M. Bayne and is situated on the American river, near Auburn. The ledge is 4 feet thick and has been cut in many different places.

At Westville the Herman mine is working twenty-five men and is paying well, if not better than ever. Supt. O. L. Barton says as soon as the road can be opened the company will put in a compressor to run the new tunnel to tap the main ledge 400 feet lower. Everything looks favorable for putting ten more stamps in the mill this coming summer.

The Avalon gravel mine at New York canyon, east of Westville, is working seven men. Supt. Worden expects soon to strike through into gravel.

Supt. B. Denton of the Sailor Canyon gravel mine says that the mine has been bonded to a German syndicate in San Francisco for a large sum.

Italian Bar mining district bids fair to be a prosperous camp in the near future, as some eight or ten locations have been made in quartz this season, and all seem to show good prospects and can be opened with very little capital.

Hobson, Ward & Co. have closed down their mine until spring, when they will reopen on a larger scale.

There is beyond a doubt going to be a boom among the mines in this vicinity this summer, especially among quartz mines, as they seem to be more numerous than gravel.

Argus: At Blue Canyon the proprietors of the Van Avery mine are getting their new concentrator in place. Work in the tunnel will be taken up again as soon as the weather becomes more favorable.

Work in the Redstone mine still remains suspended on account of deep snow.

Plumas.

National-Bulletin: The Plumas Imperial mine has developed and is now working an immense bank of auriferous gravel. The bank is 100 feet high, 80 feet of which is excellent appearing channel wash, the remaining 20 feet being strata of pipe clay. The channel is about 1200 feet wide. Hydraulicking is proceeding steadily.

M. F. Peterson has returned to the Sunnyside on the North Fork, on which work will soon be resumed.

San Bernardino and Riverside.

(Special Correspondence).—In the Virginia Dale district, on the desert east of San Bernardino, there are perhaps 600 or 700 men in a region twelve by sixteen miles, and a great deal of quiet work is being done. Dale City, platted three weeks ago, is the business center, and already has a couple of stores, a saloon, blacksmith shop, postoffice, a wagon line to the railroad, etc. The town is located at the point heretofore known as Lyons Wells, and the site was chosen on account of the water supply the place afforded. The San Francisco company which lately acquired the old Virginia Dale mine at this place has erected a 40-ton mill, which was started up this week and is said to be working satisfactorily. This plant will be a great thing for the district, as it will do custom work most of the time. Development work hereabouts has been greatly retarded by the absence of milling facilities, but will go forward right well under the new order of things. The 2-stamp mill of the North Star Company started up again this week. For several months this company has been doing systematic development work and a short time ago an expert reported $120,000 worth of ore in sight. The Leoti mine is also paying handsomely. The district contains several other notable properties, which will be mentioned in a future letter.

At Twenty-nine Palms, on the desert east of San Bernardino, the Desert Mining and Milling Co., under the superintendency of Mr. Mudge, have erected a 10-stamp mill, which was billed to start up some time this week. The mines of this group contain a great deal of rebellious ore, and the same company is figuring on the erection of a cyanide plant with fifty tons daily capacity at an early day.

At the Iron Chief mine, forty miles northeast of Walters station, on the Southern Pacific, Beach, Moore, Stephens & Stewart have a great deal of high-grade ore on the dump. Shipments to the Selby smelter will be made shortly.

At the old Santa Rosa mine, near Perris, Riverside county, sixteen employes have sued the company for back wages in sums ranging from $50 to $200.

A large body of very rich ore has been opened up in the lower workings of the Green Lead mine at Holcomb Valley. The 10-stamp mill will be started up at once.

The old Good Hope mine, near Perris, Riverside county, cleaned up $11,000 last Saturday as the result of a two weeks' run. Under the management of Mr. Sigafus the property seems to be paying handsomely.

The late run of ore from the Alice mine, same district, gave good returns. G.

San Bernardino, March 30th, '97.

San Diego.

Union: At Julian the Helvetia has been idle, but work is expected to begin again this week.

Delgrove & Phillips are having fifty tons of ore hauled from the North Star mine to the Ready Relief mill.

Farley Bros. & Co. are sinking a shaft on their mine, the Gold Cup, in Banner. They are down 50 feet and are taking out good ore.

F. O. Potter has sold the Paddock mine to J. W. Brenning of San Diego.

Shasta.

Free Press: The success of the Mountain Copper Company is now assured. By the shipment of three and one-half cars of matte per day the output of the smelter will equal the cost of operating the great plant each day. With two furnaces in operation this output is easily acquired. Operations have been retarded by the work of developing the mine at Iron Mountain. The Mountain Copper Company have been running their No. 1 furnace steadily and on Wednesday completed the repairs on furnace No. 2 and started it running. Furnace No. 3 is well under way, but will not be ready for operation for some time. At this time nine train loads of ore are delivered at the roasting plant every twenty-four hours from the mine. The train is composed of ten cars of a capacity of eight tons each. The development of the mine shows that with the consumption of 3000 tons of ore each day there is sufficient ore in sight to last for twenty-five years. With an output of 3000 tons of ore per day from the mine it will be sufficient to supply ten furnaces of equal capacity of those now in operation.

Free Press: A rich strike was recently made in the Ballou mine on the south fork of Clear creek. The property belongs to E. L. Ballou, but is under bond to Senator John P. Jones of Nevada, who has been developing the property for several months past. The strike was made in the 350-foot level, or 150 feet below the old workings. A ledge of ore which runs from 2 to 3 feet in width was encountered.

C. G. Crowell, manager for the company who own the Mad Mule mine near Whiskytown, intends starting work upon a new tunnel upon the property.

The National Mining Company has just completed a mile of road around the hill to the Garfield mine, and the mill will soon be run by electric power.

Mr. Hill of the Mountain Copper Company holds a bond on the Balla Klallala or Windy Camp mines, on which he will soon commence development work.

At Copley an extension of the pipe line for Dr. W. H. Garlick will be built to increase the pressure at the electric power house near Bull's Bar, and power furnished the National Mining Company on Rich gulch.

Searchlight: The Mammoth mine of Old Diggings, owned principally by Samuel Scheney of San Francisco, will shortly resume operations on a large scale. Two hundred tons of ore are now on the dump.

A meeting of the leading mine owners of the Harrison gulch section was held in Red Bluff last week, among those present being Captain Roberts, J. W. Frank and others owning valuable interests. It was decided to incorporate as a mining company and withdraw the mines from the market. The company will organize with a capitalization of $800,000.

The Crown Point Consolidated Gold Milling and Mining Company completed its two ore dumps last week. The new road to the mine is completed, and shipping ore will commence at once.

John M. Pfeiffer last week sold his mine at Lower Springs for $1000 to E. W. Brackett and Wm. A. Spark.

Sierra.

The *Enterprise* learns that the company who have the control of the Bigelow mine, at Sierra City, intend erecting a large mill on the mine in the near future.

Siskiyou.

News: Doggett, Craig, Harbaugh and R. M. Walker are running a tunnel on the old Pioneer mine in Quartz Valley.

The Columbia mine on old Baldy is being worked night and day, about twenty-five men being employed in extracting ore, while the mill is kept running steadily.

Winsell, Clute & Neil, who have leased the Thompson mine on Hungry creek, are piping night and day on a 45-foot bank.

A. S. Smith, of San Francisco, has leased of Dave Horn a strip of ground on Cottonwood creek above Hornbrook, and is making preparations to prospect the old channel. He is now working a crew of some ten or twelve men and expects soon to be able to double the force.

The Belcher Placer Mining Company has been incorporated, with William Baptist, president, and W. J. Bennett secretary and treasurer. Their properties at present consist of nineteen claims or about 2000 acres of placer ground, some of which are in active operation at the present time. A large part of their property is located in the Salmon River country.

Reporter: At Scott Bar the Columbia is working over twenty men, and are taking out good ore. The 5-stamp mill is kept busy and it is reported that five stamps more will be added in the near future.

William Chamberlain will resume work on the Mabel mine as soon as his co-owner, Dr. A. J. Timmons, returns from the East. The Mabel is an extension of the Columbia.

At Nolton the Seattle Company's pipe is running day and night. They have eight men in their employ.

Below Happy Camp, the Kanaka Flat mines have been located by Dr. Gregory and Mr. Brown, with the water rights for working it.

At Milliken's Bar is a high bench or bar which J. Friedland Rolls & Co. have located, with water to work. They are now prospecting by drifting and getting excellent returns.

Trinity.

Redding *Searchlight:* On the Bloss & McCleary properties at Trinity Center the area of gold-bearing gravel is 1060 acres, comprising four channels on a succession of benches from the river to the top of the mountain. All these channels carry value, and the gravel in the upper one is 90 feet in depth. Gravel is being worked now with 2100 inches of water which is brought to the ground by two ditches, one six miles and the other three miles in length. The volume of water will be increased to almost 5000 inches during the present year, and a ditch and flume to open up the deposit from the river, about three-fourths of a mile in length, will also be added shortly. A fall of 600 feet can be utilized.

Redding *Free Press:* G. L. Carr, of Carrville, is operating an old discovery called the Blue Jacket. Upon the surface he found a ledge of ore which was 40 feet in width. He began a tunnel, which, when it strikes the ledge, will be 300 feet in length and will tap the ore body at a depth of 120 feet.

On the Forget-Me-Not mine Mr. Carr has run over 1000 feet of tunnels and has a ledge of ore 4 feet in width which will average $12 per ton, and which he has tapped at a depth of 200 feet.

Journal: On the La Grange ditch extension tunnel twenty-four men are working steadily and the tunnel is being driven ahead. As soon as the weather permits a force of men will be put on to complete the ditch to Stuart's Fork. There yet remain about eight miles of fluming to bring the water to the tunnel.

Bert Kellogg is running the arrastra on his mine on Kingsbury gulch on high-grade rock.

Hawksley & Mack are surveying a ditch from the Hay Fork creek to carry 2000 inches of water for mining and irrigating purposes.

The placer mines are working the usual

number of men with good results. On the Mountain View mine, owned by Pragmore & Duncan, the arrastra is running on good ore.

Tuolumne.

Union-Democrat: At the Rawhide the present force consists of 100 men but the number will be increased when the weather will permit fuel to be landed on the property to move some machinery which is at present idle. In the main shaft sinking has been resumed from the 1000 level and will be continued to the 1300. The exact depth attained up to date is 1050 feet. The ledge at this point carries a uniform width of 30 feet of well defined quartz.

On the App all the force possible has been concentrated at the 800, where crosscutting, drifting and stoping is being carried on. The ledge on this level where being stoped out shows 20 feet of well defined quartz.

On the Santa Ysabel sinking in shaft three still continues from the 600 level. Upraising on the Mascot vein is carried on toward the 100 crosscutting connection. Work on the new mill is very slow, owing to ordered material and supplies still being tied up at Oakdale.

At the Dutch crosscutting and drifting on ore body in the 300 level continues. On the 200 stoping in ore is being carried on.

At the Mt. Jefferson the main shaft is down 280 feet, and has been abandoned by J. N. Meighan, the manager, who has commenced the sinking of a new shaft. The vein is a strong one, and the ore assays high in free gold and sulphurets.

On the Wonder mine at Big Oak Flat a 5-stamp mill has been erected on the mine. It has an ore chute 10 feet in thickness and of unknown length on the north end, and another on the south end.

Considerable surface work has been done on the Gold Bug and an ore chute of both high and low grade has been developed and is known to extend not less than 400 feet in length.

The Accident, which joins the Longfellow on the north end, is owned by Wm. and Arthur James, and has from 9 to 12 feet of ore that will work $6 per ton in free gold.

The Longfellow mine is bonded by Dr. J. L. R. Roberts & Co. Some rich ore has been struck in an incline shaft about 100 feet south of the main shaft.

NEVADA.

Salt Lake *Tribune*: The April Fool is reported running along steadily, as is also the Magnolia, at which the recent strike was registered, and there is not an idle main in the camp.

Victor M. Clement is engaged in an examination of the De Lamar mine. The prevailing opinion is that the examination is in behalf of a foreign syndicate which has in view the purchase of the property, although there is a theory that the Captain has ordered the measurement that he may have definite knowledge of the value ef the ore bodies that are now blocked out. Should a sale take place, the figure will not be less than $3,000,000, as that amount was refused when Charles M. Rolker made the examination of the mine last season and recommended that his syndicate take it up at this figure. Meanwhile the new machinery that will largely increase the capacity of the mill is being put on the ground as rapidly as possible, and thirty days later over 8000 tons a month will be going through the plant.

OREGON.

Times: Carson & Son are running a drift in their placer mine on Oscar creek, Josephine county, and have reached a depth of 300 feet. They have struck an old channel and are taking out good pay,

A deal has been closed by the Ollala Mining Company for the purchase of a large area of ground on the Ollala river, Douglas county, and work will be pushed. Portland parties are interested.

The mines in Evans creek district are being run on full time with a good supply of water; also those on Pleasant creek.

The recent strike at the head of Pleasant creek is attracting considerable attention. Fourteen claims have already been located on the lode.

A. W. Sturgis of Forest creek made a partial cleanup a few days since, after a five weeks run. Nearly $2100 worth of gold dust was taken out.

The carload of quartz from the Taylor & Crow mine on Lost Flat, Josephine county, which was crushed at the Hicks mill at Ashland last week, yielded $2,500. There were thirteen tons of the ore. The carload crushed before produced nearly $3,000.

Courier: There are twelve men employed on the Horn-Silsby-Tucker placers on the Illinois river. Considerable work has been done on the new ditch, strengthening it against the snowfall in the mountains, but they will have water for working the year around.

The Hampton-Lewis placers on Upper Grave creek keep sixteen men busy. Extensive preparations have been going on at these mines for two years and now they are about ready to run six monitors steady. A race 1200 feet long has just been completed. It is paved with railroad iron to resist the cutting process of boulders.

Baker City *Democrat*: The shaft at the Virginia Consolidated mine lacks only a few feet of being down to the depth intended before crosscutting to the Virtue ledge 500 feet.

It is the intention of the owners of the Columbia mine to at once commence deep sinking. A vertical shaft 400 or 500 feet will be sunk.

The Bradbury Bros. have sold their property north of the Flagstaff mine to J. W. McCoy, manager of the Perry mine, for $8,000.

The Grant Mining Company will carry on placer mining operations in Granite district the coming season on a very extensive scale, having reservoirs and ditches of large capacity already constructed. It is expected the company will employ upwards of 100 men in its several claims.

The machinery necessary for the erection of the smelter at Quartzburg was shipped some time ago. The smelter will enable the miners of that district to realize a good value on ore from mines that otherwise would remain unprofitable.

Oregonian: In the Cracker district, in Baker county, in the Eureka and Excelsior mine a 20-stamp mill is working. The cost of mining and milling has been brought to a little less than $3 a ton. The plant handles about seventy tons of ore a day. The ore is not free milling, as the gold is in the sulphurets. The lode is from 20 to fully 200 feet in width; the milling ore runs from 2 to 15 feet in width.

On the North Pole the lode is tapped by two tunnels, the second being 400 feet lower than the first. The upper tunnel exposes an ore chute 600 feet long, with milling ore varying from 2 to 15 feet in winth. The plant on the mine consists of a 10-ton furnace; ten stamps, and a complete cyanide plant with a capacity of over twenty-five tons of ore a day.

WASHINGTON.

Spokesman-Review: On the Colville reservation many mines are being worked.

The Green Mining and Development Company has been formed in Walla Walla for the purpose of developing the Blue creek gold mines. The capital stock is placed at $1,000,000.

The Palmer mountain tunnel at Loomis is now in the mountain 230 feet. Inside of sixty days the machinery for the new air compressor will be in position, which will increase the weekly progress to about 40 feet.

The owners of the Kalamazoo group are still developing the rich copper-iron capping on the Johnny Bull, and the size of the ledge is not yet definitely ascertained.

BRITISH COLUMBIA.

Spokane *Chronicle*: From 1000 to 1200 men will find employment in the mines around Grand Forks this summer.

Judge Spanks has let a contract for a 50-foot shaft on the Grey Eagle.

The Olive Mining and Smelting Company, which owns the Volcanic on the North Fork of Kettle river, will start work about April 15th, with a large force of men. The company already has a tunnel in 350 feet and several shafts from 10 to 20 feet deep. It is the intention to erect a smelter as soon as sufficient development work is done.

The final payment has been made on the Mother Lode claim in Deadwood camp. The total sum paid is $16,000.

The Placer gold excitement has abated some at Salmo as nearly all the ground in that vicinity has been staked and the owners are now waiting till a thaw comes to see what their claims contain.

On the Deer Park mine at Rossland, the shaft will be pumped out and the work of sinking renewed. It is intended to sink until the 300-foot level is reached.

A member of the Goodersham-Blockstock syndicate in Toronto, informs the people there that the War Eagle Company has contracted for a large amount of material and the machinery for their smelter at Northport.

The sale of the Homestake, R. E. Lee and Maid of Erin by Mr. Linnard to an English syndicate has been definitely settled and Mr. Linnard has taken a large interest in the property himself and will return at once and act as manager of the property. One of the provisions of the sale was that a smelter should be erected this spring. The smelter will be located on the Maid of Erin ground and will be 350 tons capacity.

The Payne mine is shipping sixty tons of ore a day, which is more than any other Slocan property has ever shipped.

The Silver King mine is employing 180 men at the mine and smelter. At the mine a large rich body of ore has been unexpectedly found in the lower tunnel, which was being run to tap a body of ore discovered last year by a diamond drill.

Work is being steadily pushed on the Primrose group. This group is on a parallel vein with the Silver King.

The Two Friends, Slocan property, is now working twenty-five men, most of whom are employed on the 600-foot tunnel, which is being run to tap the ledge.

Things are running full blast under the Heinze management at the Kootenay and Columbia mine. The face of the long tunnel is in solid ore, which is fully 8 feet wide. The present showing is at a depth of 300 feet and it is thought that the ore will improve when more depth is gained.

Spokesman-Review: In the Slocan the Wonderful is working twenty-five men and the shipments from the mine amount to one-half car a day.

The Slocan Mining and Milling Company's concentrator is employing fifteen men. At present the mill is being run on Idaho ore.

The Mile Point at Ainsworth has recently passed into the hands of the British-Canadian Gold Fields Company. The new owners will employ twenty men in the further development of the property.

The British Canadian Gold Fields Company have bonded the Howard Fraction group of five claims on Springer creek, near the foot of Slocan lake. The bond was for $50,000, ten per cent of which was paid down; $17,000 will be paid October 1st. The new owners will put fifteen men at work developing the property at once.

UTAH.

Tribune: The plans for the projected mill upon the La Cigale have been approved and its construction will be commenced in the next ten days. The mill promises to be one of the most perfect that has been put up in the West. The tanks will be provided with a self-dumping device, everything will be on a system of gravity from the time the ore leaves the mine, and it is expected to handle ore at less cost than has yet been accomplished in Camp Floyd mining district. As planned, the mill will have a capacity of 200 tons a day with which to begin.

The mill at the Northern Light has been started up. Six tanks have been constructed and eighteen more will be put in as soon as possible. With these the mill will have a capacity for handling over 250 tons a day. The ores at present show an average of $12.75 per ton, with sufficient blocked out to last the mill for an indefinite period.

Eureka *Democrat*: The shaft at the Cornucopia, which is being worked under the Golden Treasure lease, is now down 254 feet, and is being driven as fast as two shifts can push it. It is the intention to run a drift to the vein from the 500 level as soon as that depth is reached.

Development is being pushed with as large a force of men as can work to advantage at the Jason Mining and Development Company's property. Some fine looking ore was encountered this week which assayed 56 ounces in silver.

The vein in the Domingo, adjoining the Buckeye at Silver City, has widened out to 2 feet and a shipment of $30 ore is being prepared.

Bingham *Bulletin*: Word comes from the Last Chance mines that connection between the British tunnel and Hooper has been made. The Hooper is making a large showing of ore, and a steady run of the mill is planned whenever the product can be hauled.

The output of the Old Jordan & Galena is likely to reach nearly 2000 tons this month, an average of eighty tons being the present daily shipment.

Mercur *Mercury*: The Wonder has broken into the vein.

The Brickyard crosscut is now about 185 feet in length, and the ore bodies hold their own well in appearance and size. An upraise has been made from the crosscut 20 feet all in ore, and this, added to the 20 feet of ore developed below, makes the vein at this point 40 feet in thickness and no hanging wall yet.

The shaft in the Gladstone is down 220 feet, and a blue shale, heavily impregnated with iron pyrites, is being encountered.

Tintic *Miner*: In the Picnic the ore has been struck on the 375-foot level, a short distance from the shaft, and shows values of 59.4 ounces silver, 48.5 per cent lead.

Shipments from the district for the week are as follows: From the Bullion-Beck mine, twenty carloads ore; Bullion-Beck mill, five carloads concentrates; Eureka Hill mine, five carloads concentrates; Ajax, nine carloads ore; Mammoth mill, eight carloads concentrates; North Star, two carloads ore; Dragon iron mine, two carloads ore daily; Noon's iron mine, one carload ore daily.

The Jason Mining Company has resumed work on the Silver Hill. The shaft is down 80 feet, and will be sunk at once 100 feet deeper. Considerable pay ore is already exposed in the workings of the property.

A new strike of ore is reported this week on the 500-foot level of the Four Aces.

Salt Lake *Tribune*: At Frisco, in the Horn Silver, the output consists of forty tons of concentrates and as many tons of crude ore daily. To accomplish this a force of 170 men is required, and at no time in recent years has the bonanza, which has presented dividends amounting to $5,130,000, presented a better appearance.

The lost vein for which the management of the Utah, in Deep Creek, has long been digging has been found. The success of the Utah was among the first things to draw attention to Deep Creek. From the grass roots the mine has paid. At a depth of 270 feet, however, the main ore body disappeared, and since that the stoping has been on a parallel chute. Recently it was decided to prospect for the vein off the station at which it was lost, and a letter from the superintendent assures the management that the lost chute has been found again.

WYOMING.

Near the summit of Medicine Bow range, in southern Wyoming, during the past year several Eastern syndicates have become interested in the camp and arrangements are now perfected to commence active operations on an extensive scale as soon as the season will permit. The ore bodies in this camp are principally a bluish quartz, carrying iron pyrites and assays give from $6 to $12 per ton gold.

A syndicate has, through J. W. Myers of of Salt Lake, obtained a bond on several of the most valuable gold and copper properties in the Seminoe mining district, in Carbon county, north of Rawlins. Among the properties bonded are the Penn, which was purchased some fifteen years ago by the Duponts and still belongs to the estate. A large amount of development work has been done on this property. A stamp mill was erected for the purpose of treating the ores by amalgamation, but proved a failure, owing to the refractory character of the ore. The King, Independence, Rawlins and Deadwood are also included in the bond, and considerable work has been done on these.

COLORADO.

BOULDER COUNTY.

(Special Correspondence).—The Daleno Mining and Milling Company is building a chlorination mill for treating the telluride ores of Boulder county. During the past twenty-seven years every new process for saving the precious metals contained in the so-called refractory tellurides has been erected in this county on a small or large scale without any marked success. A bromine process built at a cost of over $80,000 by Henry R. Cassell and B. C. Hinman of New York, metallurgists and chemists, for the purpose of saving the gold and silver contained in the low-grade ores of the Keystone and Kekionga mines, the cost of treatment not to exceed $3.50 per ton, has shut down after an expenditure of over $150,000.

Prof. Cassell claims to be the inventor of the cyanide process which he claims has proven unusually successful on several grades of mineral that were free from the baser ore, such as zinc, galena, copper, etc. Boulder has had two elaborate plants built in which cyanide was used for the purpose of extracting the gold and silver from telluride ores, and although the owners, after spending about $100,000, claimed the process a success, yet both mills are shut down.

Two chlorination mills are now in course of construction in this city, and a third, to be known as the Boulder Ore Reduction Company, will soon begin the erection of a plant, at a cost of $150,000. The process to be used is chlorination and lixiviation and precipitation by electricity.

Chlorination has certainly been successful in treating ores throughout the mining districts of the great West, but has not been thoroughly tested on the telluride ores of Boulder county, and until the owners demonstrate beyond a doubt their ability to save the amount of precious metals contained in the low-grade (from $10 to $20) ores which are so abundant in Boulder county, the average miner will not enthuse to any great extent over promises.

We have rich gold mines in Boulder county; our mines produce gold ore, some of it yielding over $100 per pound. When the pockets are encountered in the Golden Age mine, Jamestown, the leasers often take out $2000 and $3000 in three or four days. Other leasers pan out from $20 to $30 per pound from their best ore, and retort it, then sell the tailings or concentrates, which are caught in a tub, for $3 or $4 per pound to the sampling works. Such rich veins are numerous in Boulder county mines, which are operated principally by sets of leasers on portions of ground throughout them.

The old Horsfal mine on Gold hill, the first lode claim ever discovered in Boulder county, by David Horsfal, in the spring of 1859, produced $100,000 in gold the first year by washing by rocker and sluice boxes; but of late years the property has not been in operation, until a lease and bond were obtained from Dick Blower, one of the original owners.

The Emancipation mine is producing rich mineral in large quantities. The property is owned by a London, England, syndicate, who purchased it last fall, after the mine had been idle for ten years through litigation over the crossing of two veins, Emancipation and Western Slope, each party claiming the intersection and the rich ore contained therein. About $50,000 was expended in fighting the case through the several courts, resulting in the bankruptcy of the original owners and the deeding of the mine over to the several lawyers for fighting the case. The interests of these several persons were bonded to one man; then the sale was consummated for $125,000.

Williamson & Haffner of Denver purchased the Scotch company's mill at Salina last week for the purpose of placing a new chemical process in the building to treat ore from their Great Britain and Sackcut mines, Sugar Loaf, which contain large quantities of low-grade mineral in combination with the high-class smelting ore. Mr. Williamson says he can treat his ore for $2 per ton and save over 95 per cent of the value contained therein.

The Milan mine at Sugar Loaf is producing a quantity of ore that yields $1 per pound. A specimen of the stuff is on exhibition in the window of the First National Bank of this city. This property is also owned by an English syndicate, and is rapidly improving by more extensive development.

WM. M. RULE.

Boulder, Colo., March 24th, '97.

Republican: The Cripple Creek Consolidated Company has started on the plan for the development of the Genevas. A station in shaft No. 1 has been cut at 450 feet, and sinking the shaft will be crowded with all possible speed.

The Good Will Tunnel Company has taken a contract to drive a drift from its tunnel on the vein cut in Ellen McGregor ground.

The new shaft-house and gallows-frame at the Granite are completed, and work under ground has been resumed. Manager Cone proposes sinking the deep shaft on the property to an indefinite depth, and will send out levels to explore the territory in all directions at each 100 feet.

The Chicago-Cripple Creek tunnel is being driven under Gold and Globe hills at the rate of 10 feet a day, and is now somewhere between 1,800 and 2,000 feet in. Three drifts are being run on low-grade ore, two on the 1,300-foot vein, and one about 400 feet farther in the hill. On the 1,300-foot vein about 200 feet of drifts have been run.

The Gregory shaft on the Raven group is down 380 feet and making progress of 2 feet a day. The tunnel from Squaw gulch is 2,000 feet into the hill, and is now driving ahead on the vein that cuts the Snowy Range and Maid of Erin.

The new extension of the Leadville mining district in a southerly direction shown by the Nil Desperandum strike is gaining in importance. This opened up an ore body on the west side of the fault in the Dome ground and since then the leasers have opened another ore body on the east side of the fault. The iron was struck at the bottom of a 125-foot shaft and on drifting in some 20 feet on the lower level a body of iron was found which runs from 6 to 30 ounces in silver and 36 to 37 per cent excess of iron.

The Nisi Prius Company some months ago secured a lease on the Crown Point ground on Rock hill and drained the ground of its immense amount of accumulated water. During the past few months development work has been vigorously pushed, and recently an important strike was made. An entirely new body of ore has been broken into, 14 feet high and 6 feet across the face of the drift.

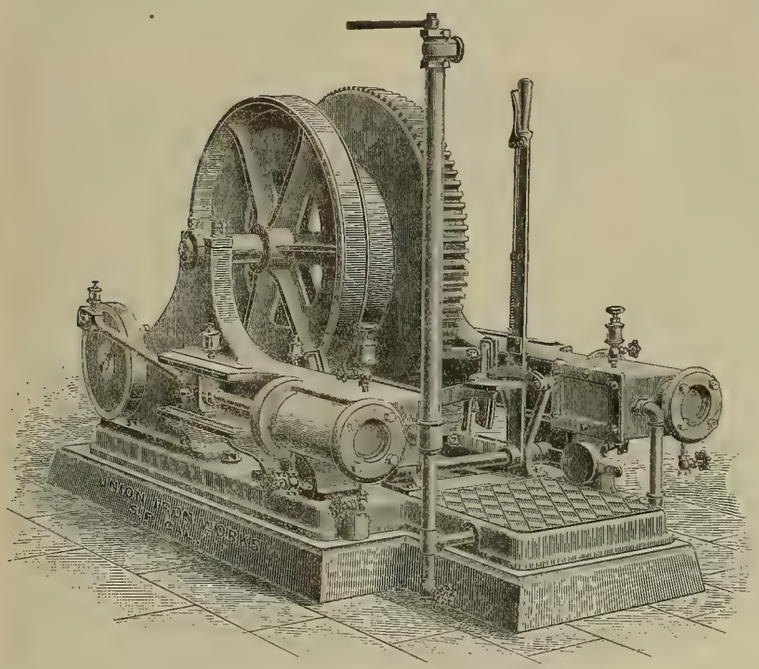
The discoveries and renewed activity on Rock hill are the direct result of the reduction in smelter charges and the higher price paid for iron.

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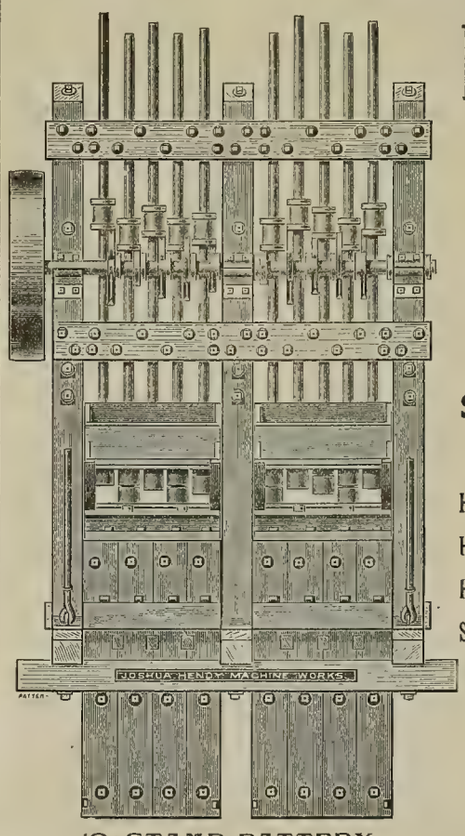
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The Proposed Tariff on Lead.

Considerable discussion still goes on in and out of Congress regarding the tariff schedule as affecting lead and lead products. The question is one of interest to American mining industries. The House of Representatives passed the tariff bill on March 31. In the Senate full data and convincing argument will be needed to alter the provisions regarding any dutiable article.

The bill as presented gives duty as follows: Lead in ore, 1 cent; lead bullion, etc., 2 cents; in sheets, pipe, etc., 2½ cents.

In this connection it is to be said that in a recent interview with a prominent smelter owner of Colorado he said to a representative of this paper:

"It is a matter of marked interest to note that the mining public of Colorado, who several years ago were decidedly opposed to the admission of lead flux ores of our neighboring countries, are to-day decidedly in favor of it, and their Senators and Representatives are advocating this adjustment in the House and Senate. It has been proved beyond any question that these lead ores are necessary to the successful operation of our American smelters. Fully one-third of our capacity would be closed down if it were not for the foreign ores. It is our desire to stimulate the price of lead, and we are confident that it cannot be done in any other way than by the adoption of this schedule of rates; and I believe that this proposition is demonstrable, first, because if the lead is admitted in the form of ores as a basis for lead smelting, these ores are distributed to smelting companies all over the Western States, and the lead product finds its way to the various markets in the United States and does not accumulate at any particular point. Moreover, it is not brought in in excess of the requirements of American smelters, to keep their capacity going and to smelt the siliceous and other refractory ores offered. On the contrary, if they were shut out they would be smelted in larger quantities in Mexico and Canada, and the lead bullion would accumulate at the large markets, and especially at New York, and this large, unnecessary accumulation, far beyond the ability of the local concerns to consume, always stands as a menace to the market, and frequently thoroughly demoralizes the prices. It must be taken as a primary proposition that the lead cannot be kept out of the United States. It must come in, and will come in; if not in one way, in another. Therefore, we hold that it should come in in raw material, and form the basis for American smelting and refining, and serve the best purpose to the largest number of American miners of refractory ores."

Another phase of the matter is presented in an interview this week in which a large smelter owner says: "In the lead tariff agitation within the past few days, appears evident the strong fight being made by the National Lead Company. They are proposing, and fighting with all their strength, for the exclusion of lead ores by a prohibitive tariff, and providing well for the possibility of importing large quantities of foreign refined lead and bullion. Their purposes seem:

"First—By the exclusion of lead ore they propose to weaken the power of all western smelting and refining interests by lessening their ability to secure lead flux ores, thereby curtailing to a very large extent their refined lead supplies, so that they will become less of a factor in the market.

"Second—They want to leave the doors open for the largest importation of foreign refined lead and bullion, so that they may be in position at any time to smash the lead market, and keep it in a demoralized condition, pending their accumulation of necessary supplies. It is a well-known fact in the East that the National Lead Company, whenever the market has been firm, with tendency to advance, have imported a large batch of foreign lead, and kept it in bond in New York. This so largely increased the visible supply as to stand as a menace to the market, and actually depreciated it, so that they could lay in their supplies; then they would reship the lead to Europe and sell. This is the kind of a proposition we are contending with now. It seems that in the very nature of things this would cement the interests of not only smelters and miners of silicious and other refractory ores, but the lead miners as well. Our desire is primarily to advance the price of lead, so that American mines, which are not now in operation, will secure a sufficient price for lead to enable them to operate and increase their output.

"In the next place, pending the increase of lead supplies in the United States, we want to fill up our deficiency from Mexican and British Columbia mines, so that the miners of silicious ore, iron ores and limy ores, which are non-lead bearing, may be in position to find an ample market for their ore. There is a strange condition existing in the Black Hills of South Dakota, where there are untold quantities of silicious ore and hardly a pound of lead or copper flux. There is no lead smelter in the camp, because lead supplies cannot be secured. The Missouri river cannot take the ores because they cannot secure the lead flux. The Black Hills miners are asking that their ore be taken; they are demanding lead ore absolutely free of duty, and both Senators from that State are advocating this plan. The Senators from Idaho and Senator Cannon, from Utah, are demanding a prohibitive rate on ore. It would be better if we could agree to a reasonable duty on lead in ore, and a higher duty on refined lead, so that the American mines located in the interior of a vast country, which must of necessity stand very high cost of transportation to reach the more settled districts of our country, which provide the markets, may have ample opportunity to mine their ores and get them to this market, leaving them something of a profit. Their best policy would be to agree upon this as a reasonable compromise, and a reasonable adjustment, as between the ore and the refined article, and all would find in the end that the improved price of lead would come not from the exclusion of ore, but from the advance in the duty on refined lead, which would restrict the importation of the refined article, instead of excluding the raw material and admitting the refined article.

"The National Lead Company manages to keep up the duty on white lead and keep down the duty on pig lead; the price of white lead does not decrease in proportion with the price of pig lead. The general interests of this company are detrimental to all of our western mining and smelting interests."

The present duty on pig lead is 1 cent per pound, lead in silver ore ¾ of a cent per pound, being just one-half of the duties in the McKinley bill of 1890.

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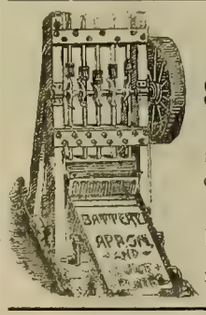
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Coast Industrial Notes.

—Alfalfa hay from Nevada is supplied in Grass Valley, Cal., at $10.50 per ton.

—Hollister, Cal., has voted for the issuance of $35,000 in bonds to put in a sewer system.

—Oranges which sell for fifteen cents per dozen in California, are worth $1 each at Circle City, Alaska.

—Construction of the first foreign warship ever built in the United States has been begun by the Union Iron Works, of this city, on the Japanese cruiser.

—The Santa Fe Railroad Company to-day inaugurates a 71-hour schedule for their "California Limited" between Los Angeles and Chicago. This makes a cut of exactly twelve hours in the time.

—The Tacoma Railway and Motor Company, operating most of the electric and cable street car lines in Tacoma, Wash., was sold last Saturday under foreclosure for $100,000 to the General Electric Company.

—The Vancouver, B. C., city council has made an agreement with an English firm to build a smelter and refinery there. The city gives exemption from taxes and 50,000 gallons of free water daily for ten years.

—The S. F. & S. J. V. road engineers commenced tracklaying on the Hanford route last Monday. The work will be pushed at the rate of a mile a day. Work has also been commenced by the graders on the Visalia route.

—Sonora, Tuolume Co., Cal., expects that the Sierra railway, from Oakdale, Stanislaus Co., will be built into that place and be in running order by Sept. 1st, '97. Graders are at work and some of the material is on the way.

—Construction of the Alviso, Cal., railway has begun and trains will be running between San Jose and Alviso during the summer. As soon as the track is laid, steamers will be put on between Alviso and San Francisco to connect with the trains.

—Construction has begun on the electric power enterprise, San Gabriel, Cal., where the entire flow of the San Gabriel river for eight miles is to be taken out of its natural channel, carried through tunnels and redwood stave pipes and dropped 400 feet to electric generators. The estimated cost is $750,000.

—At Everett, Wash., dredging in the harbor goes on night and day. The dredging will be 2900 feet long, 50 feet wide, with an average depth of 5 feet of earth removed. The dredging began about 2000 feet south of the dike, and the dirt is delivered through a long pipe 1000 feet inside the channel. The dredger pumps about 3000 yards of earth in twenty-four hours.

—The Folsom Electric Power Company asks from Woodland and Yolo county a franchise to build an electric road from Elkhorn on the Sacramento river, through Woodland up to Rumsy, in Capay valley. In payment for said franchise, electric power to run the street railway system, which is offered free to Woodland, will be furnished for almost nothing. The two propositions will probably be put to a vote of the people at the yearly municipal election.

—The California culture of olives has increased so rapidly that the State now has a monopoly of the market of this country. The crop last year netted $250,000 to the growers, but this year it is estimated the output will yield $3,000,000. The reason for the expected great increase is that a great number of orchards bear this year for the first time. It take seven years to bring an orchard to profitable bearing. Properly tended the trees continue to produce for centuries.

—President Ripley of the Santa Fe practically confirms the report of the deal between the Santa Fe and Southern Pacific, by which the former obtains control of the Mojave division of the Southern Pacific, extending from Mojave to The Needles, 240 miles. This piece of road heretofore has been operated by the Atlantic & Pacific, and the Santa Fe has trackage over it. By this deal, however, it will be placed in exclusive possession of the property and will now be able to reach the Pacific ocean over its own tracks, independently of any of its neighbors.

—The Nevada City, Cal., *Transcript* says that those parties holding the controlling interest in the Grass Valley Railway & Tunnel Company have reached an agreement with the controlling interest of the Gold Bank Tunnel Company as to the price and terms of the proposed sale. None of the Grass Valley Tunnel Company's stock was ever issued. The Gold Bank Tunnel Company's stock is owned by about 600 stockholders in Nevada City, Grass Valley, and a few in New York and London. No shares were ever sold for less than $1, and from that to $8. The management has kept a promise for twelve years that there should be no assessments.

—Consul-General Jernigan of Shanghai, China, says an important article of import at Shanghai is American lumber. To date, this has principally consisted of pine lumber from the States of Oregon and Washington, though considerable redwood from California also finds an appreciative market, as does timber from British Columbia. The eastern part of China is almost denuded of trees, causing the native supply of timber to be very limited. The regions back of Fuchau furnish considerable, not suitable for building purposes, in a foreign sense, but affording the means of a large traffic between the natives. It is from the Fuchau regions that the wood for making coffins is mostly obtained, the superstition of the Chinese permitting only certain kinds to be used for this purpose. From Hunan and other parts of western China large quantities of pine are cut and wafted down the Yangtze river, but as a rule it is of a very inferior quality. Some wood finds its way from the interior to Canton. Teak and other varieties of hard wood are imported from the East Indies, Siam and Burmah, and some pine timber comes from Japan. Recently a lot of railroad ties were brought from Japan to Tientsin. The rapid growth of Shanghai, and more especially the building of large cotton mills and silk filatures there and in other cities, have largely increased the import of pine timber. This will appear from the following table:

	1895—	
	Quantity.	*Value in U. S. Gold.*
Hardwood beams, cubic ft.	344,396	$137,768
Softwood beams, square ft.	4,380,371	63,078
Hardwood planks, cubic ft.	501,468	180,528
Softwood planks, square ft.	18,769,599	270,282
Teak planks, cubic ft.	30,353	9,769
Poles, pieces	9,872	3,949
Masts and Spars, pieces	127	20,320
Teak logs, cubic ft.	947	203

One of the largest lumber dealers at Shanghai furnishes the following statement of sales of pine lumber made by the principal lumber firms for the years 1893–1896:

	Square Feet.
1893	6,000,000
1894	6,000,000
1895	12,000,000
1896	14,000,000

The customs returns for 1896 are not yet published, but it is estimated that between 20,000,000 and 30,000,000 square feet of timber were imported during the year just closed, and that there were about 11,000,000 square feet on hand. As stated, the greater quantity of the lumber comes from the United States, and the quantity imported amounted in 1896 to 14,000,000 square feet.

—The engineers, who were forced to desist on account of the storms, will return to their labors to-day and complete the surveys, together with the cost of construction, for the Rawhide Gold Mining Company's electric plant in Tuolumne Co., Cal. The company has an option on two sites, and on the reports of the engineers in charge will depend the final selection. Should the one on the Stanislaus river be adopted, power will have to be transmitted seven miles; while should the report favor the Tuolumne, the distance would be thirteen. The *Democrat* says either one or the other will be agreed on very shortly, and on the first day of June work begins on the 1000 H. P. plant. The force generated will be used in operating the machinery about the Rawhide and App mines.

Personal.

H. F. CALENBURG has been appointed superintendent of the Gray Eagle mine in Placer county.

M. C. BULLOCK, president M. C. Bullock Manufacturing Company, Chicago, is visiting San Francisco.

ALMARIN B. PAUL has returned from Shasta Co., Cal., where he installed an electric plant for the National Mining Co.

CHAS. E. UREN of Grass Valley, Cal., is considering a London proposition to look into a Mexican mining property.

CHAS. A. BROCKINGTON has been reappointed superintendent of the Orleans Mining Co., Grass Valley, Cal., one of the oldest mining incorporations in the State.

CHARLES BUTTERS has left London for Johannesburg, South Africa, where he will remain some time—probably over six months. On his return he expects to come out to the United States again.

PRESIDENT MARK W. HARRINGTON, of the University of Washington, at Seattle, has sent his resignation to the Board of Regents and it was accepted. His place will be filled temporarily by the appointment of Professor W. F. Edwards.

R. L. DUNN, the mining engineer, who recently returned from an extended professional trip to Siberia, brings with him much hitherto unpublished information concerning that largely unknown, but interesting, country. In this week's issue is given a very comprehensive paper written by him on gold mining there. Siberia is quite accessible to trade from San Francisco. The MINING AND SCIENTIFIC PRESS suggests that the Manufacturers' and Producers' Association invite Mr. Dunn to deliver a lecture from his observations of Siberian trade and industry.

Recently Declared Mining Dividends.

Le Roi Mining Company, Rossland, B. C., $25,000; payable April 1st.

Penna M. Co., Grass Valley, Cal., 5 cents per share; payable immediately.

Idaho, Slocan, B. C., $20,000; payable March 25th. A total of $152,000 to date.

Alice Gold and Silver Mining Company, Utah, $20,000; payable April 7. Total to date, $1,015,000.

Calumet and Hecla Copper M. Co., Michigan; a quarterly dividend; $5 per share; payable April 23.

Morning Star Drift Mine, Placer Co., Cal., on March 29th declared dividend No. 76, of $5 per share, payable immediately.

Book Notices.

"Gold and Silver Ores. What Is Their Value? Simple Field Test for Prospectors With an Inexpensive Outfit." By William Hamilton Merritt, F. G. S., Associate Royal School of Mines; Lecturer, Mining Engineer, School of Mining, Kingston, and Instructor of Prospectors' Classes; late Commissioner Royal Commission on Mineral Resources of Ontario. T. R. & J. P. Clougher, publishers, Toronto. A handy little volume, which will be sent to any address upon receipt of price, 75 cents.

"Metals; Their Properties and Treatment," New edition by Professors Huntington and McMillan. Published by Longmans, Green & Co., 39 Paternoster Road, and 91 Fifth Avenue, New York. Intended largely as a text-book for metallurgical students, and up to date from an English standpoint. Is a book of 550 pages, with illustrated descriptions of the several processes of reduction of ores, smelting of copper, gold and silver extraction, etc. Price, $2.50.

Recent California Mining Incorporations.

Monte Cristo G. M. Co., S. F. C. W. Cross, F. P. Kelly, W. M. Abbott, H. Newburgh, W. D. Harper; capital stock, $1,000,000; $1250 subscribed.

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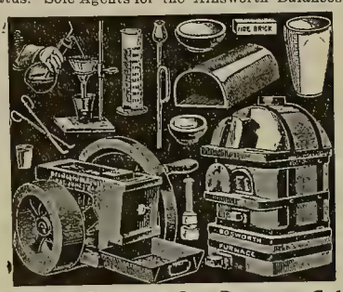
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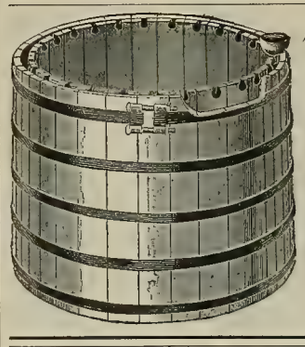
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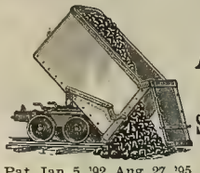
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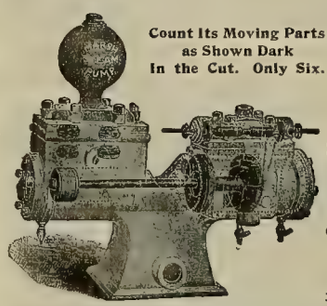
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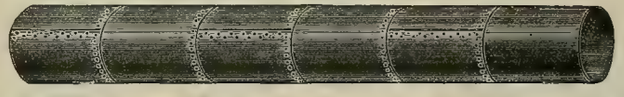


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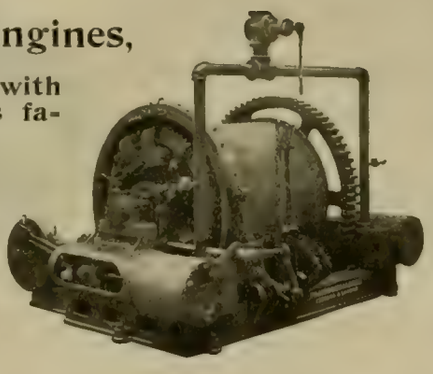
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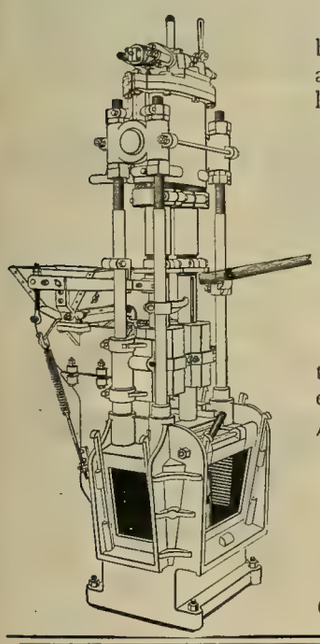
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FOR THE WEEK ENDING MARCH 23, 1897.

579,316.—VOTING MACHINE—John B. Clot, S. F.
579,384.—BRICK MACHINE—W. E. Damon, Pomona, Cal.
579,295.—FLOWER POT—Hattie Delzell, Jackson, Or.
579,269.—ROLLER BEARING—R. W. Hent, S. F.
579,519.—BROOM HANDLE—Loeber & Harvat. Los Angeles, Cal.
579,490.—BICYCLE WHEEL—J. A. Magnusson, Tacoma, Wash.
579,348.—FLOORING—W. McPherson. Quincy, Cal.
579,331.—CUFF FASTENER—F. E. Rockstroh, S. F.
579,545.—ROLL PAPER HOLDER—W. B. Rust, Portland, Or.
579,188.—HUB ATTACHING DEVICE—J. F. Spencer, Pomona, Cal.
579,457.—THROTTLE VALVE—J. C. H. Stut, Oakland, Cal.
579,286.—TRUCK—J. Wilhelm, Portland, Or.
579,373.—TENT—J. M. Wolbrecht, Chula Vista, Cal.
26,784.—DESIGN FOR PUZZLE—G. L. Heugel, Los Angeles, Cal.

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Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SEPARATING THROTTLE VALVE.—John C. H. Stut, Oakland, Cal. No. 579,457. Dated March 23, 1897. This invention relates to devices by which the steam in the steam pipe is controlled on its way to its place of use, and it is especially designed to separate the water from the steam which may be intermixed therewith, so that all water coming with the steam from the boilers, and which results from condensation in the steam pipe before it reaches the valve, will be separated from the steam and allow the latter to enter the place of use in a dry condition, while the water will be led to a convenient receptacle. It consists essentially of a casing having a valve controlling the supply of steam to its place of use; a device for mechanically separating the water from the steam, said device consisting of a large number of small openings arranged in a plurality of separate sets occupying different vertical planes and separated by a space or passage so that the steam is caused, in passing through said openings or passage, to bend upon itself a plurality of times in its flow from the exit; said openings are made in parts adapted to be removed when worn for the substitution of others.

CUFF FASTENER.—Frederick E. Rockstroh, San Francisco, Cal. No. 579,331. Dated March 23, 1897. This invention relates to that class of fasteners adapted to attach the cuff to the inner surface of the coat sleeve, whereby the projection of the cuff beyond the coat sleeve is always the same, and the means of disengaging the two are such that it can be easily accomplished at any time. It consists of a plate having means whereby it can be secured to the part to which the cuff is to be attached; a freely movable ring or link connected with one end of the plate; a hook freely connected at one end with said ring; a double-headed shank button fitting to the button-holes of the cuff and having one of its heads provided with a loop or eye with which the hook detachably and slidably engages. In conjunction with this is a guard loop on the hook to engage its point to insure its engagement with the loop or eye of the button.

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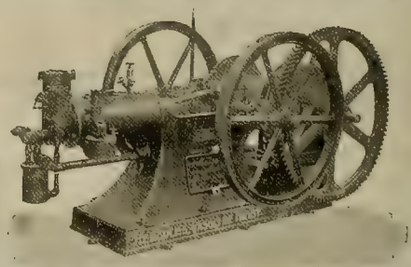
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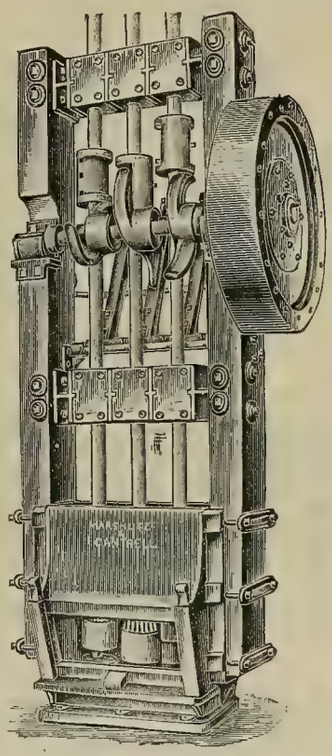
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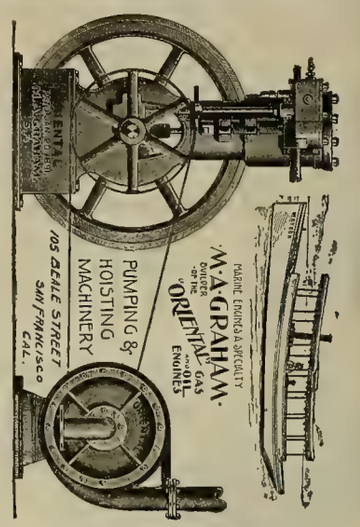
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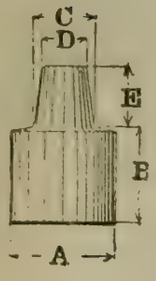
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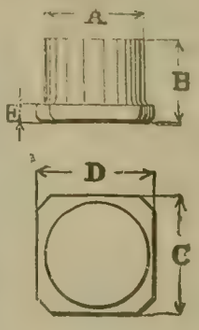
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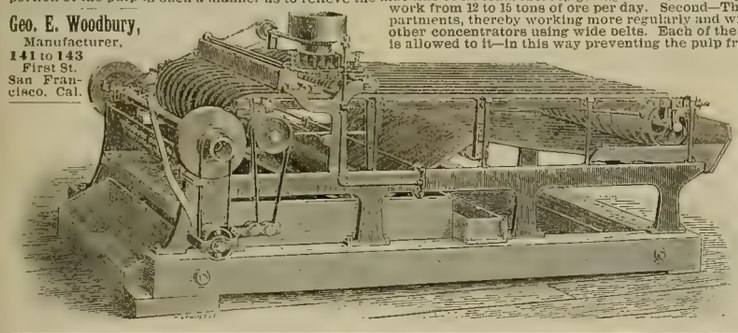
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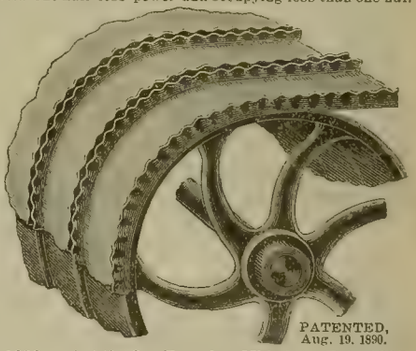
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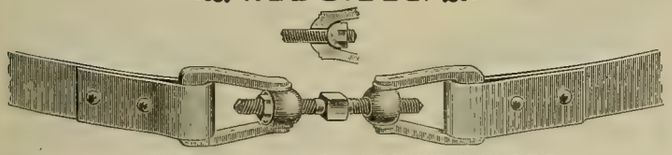


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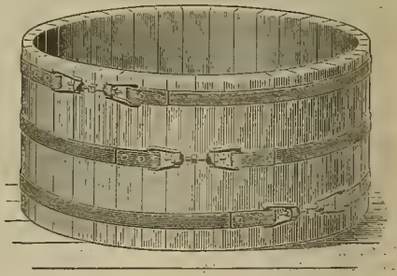
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PAN AND SETTLER STAVES.

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—AND—

Water Tanks of all Sizes.



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30 and 32 FREMONT ST., SAN FRANCISCO.

Spadone's Concentrator Belts. Patented.

The "SPADONE" Curved Edge Concentrator Belt is attracting much attention among mining men, its merits appealing to the milliman of practical experience.

Illustration (Fig. 1.) shows a cross-section, and (Fig. 2.) shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

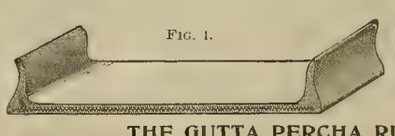


FIG. 1.

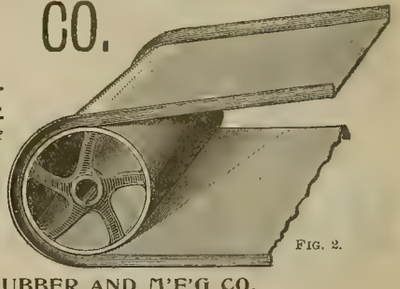


FIG. 2.

We shall be pleased to quote you also on Water, Air Drill, Steam, Suction and Fire HOSE, RUBBER BELTING and RUBBER PACKING. Correspondence Solicited.

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Electric Lighting. Electric Power.
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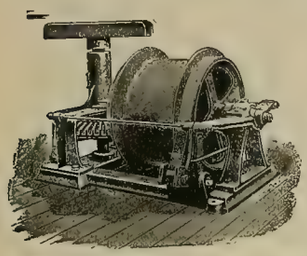
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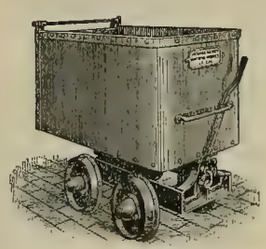
"Davis" Horse Power Whims. Ore and Rock Cars.



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ORE and WATER BUCKETS.

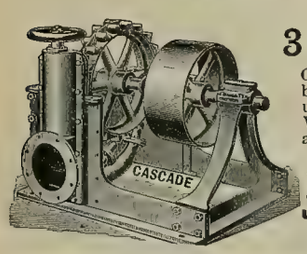
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Adapted to all Heads from

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Our experience of 33 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

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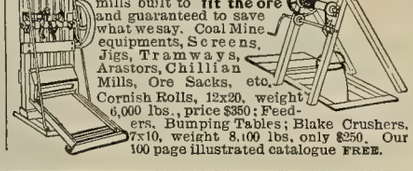
THE CHEAPEST PLACE ON EARTH TO OUTFIT A MINE

—IS AT—

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Ores tested and amalgamation and concentration mills built to fit the ore and guaranteed to save what we say. Coal Mine equipments, Screens, Jigs, Tramways, Arastors, Chillian Mills, Ore Sacks, etc. Cornish Rolls, 12x20, weight 6,000 lbs., price $350; Feeders, Bumping Tables; Blake Crushers, 7x10, weight 8,100 lbs, only $250. Our 100 page illustrated catalogue FREE.

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Rock Drilling, Air Compressing, Mining and Quarrying

Machinery.

100 Broadway, - - - New York, U. S. A.

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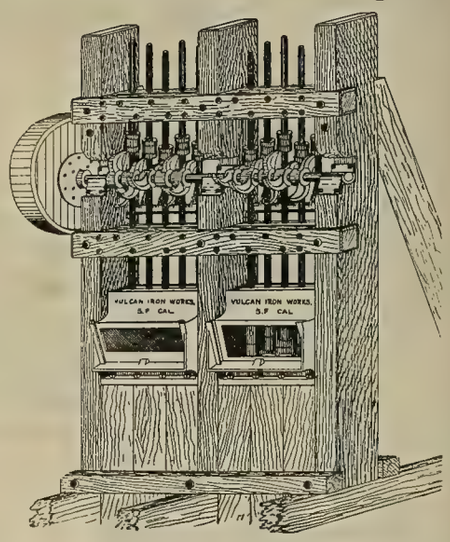
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Mining Machinery.

Stamp Mills

Of the Latest Improved Design for

Gold Milling.

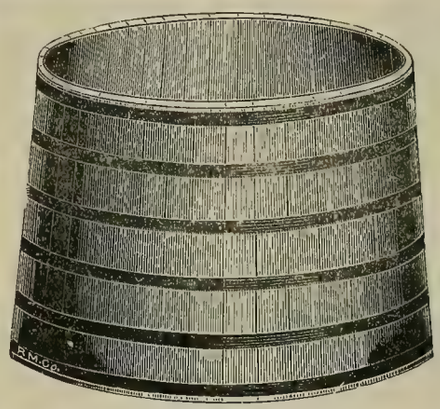


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For Conveying Ore, Etc.

Vulcan Iron Works,

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The Best Tank

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And Selling at

Prices Lower Than Ever.

IF INTERESTED, SEND FOR CIRCULAR AND PRICES.

Pacific Manufacturing Company,

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THE OLD RELIABLE!



ALBANY

LUBRICATING COMPOUND

TWENTY-EIGHT YEARS' CONTINUOUS SERVICE in the great Mines, Steamships, Railroads and Mills all over the world prove it to be

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DEALERS IN MACHINERY, OILS, MINING AND MILL SUPPLIES, ETC.

ADAMANTINE SHOES AND DIES

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Cams, Tappets, Bosses, Roll Shells and Crusher Plates.



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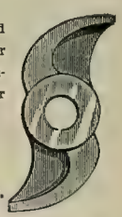
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These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for illustrated Circular.

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MANHATTAN RUBBER BELTING, PACKING AND HOSE,
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Incorporated Under The Laws of New York.

Capital paid in..... $2,700,000.

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GOLD, SILVER, LEAD AND COPPER ORES,

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SMELTING WORKS:
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We use the following Cipher Codes at our Argentine Works: A. B. C. Code; Moreing & Neal's Code and Bedford McNeill's Code.



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THE FINLAYSON PATENT WIRE ROPE TRAMWAY.

THIS TRAMWAY IS THE BEST THAT HAS EVER BEEN PLACED ON THE MARKET. IT HAS NO RIVAL. IT IS STRICTLY AUTOMATIC AND ITS CAPACITY RUNS UP TO 1000 LBS. PER BUCKET. ANY ONE CONTEMPLATING THE ERECTION OF A TRAMWAY SHOULD INVESTIGATE ITS MERITS BEFORE PURCHASING ELSEWHERE. . . . . .

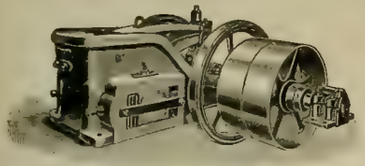
THE COLORADO IRON WORKS COMPANY, Denver, Colo.

SOLE AGENTS AND MANUFACTURERS.

WE ARE MANUFACTURERS OF AND CONTRACTING ENGINEERS FOR **Gold, Silver, Lead, Copper and Pyritic SMELTING FURNACES.**

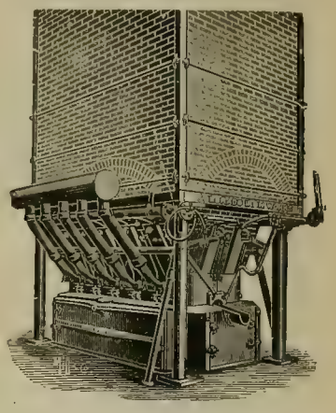
AMALGAMATION AND CONCENTRATION PLANTS.

Investigate Our Late Improvements in ORE CRUSHING MACHINERY.
We Guarantee Capacity Per Day to Any Degree of Fineness. . . . . .



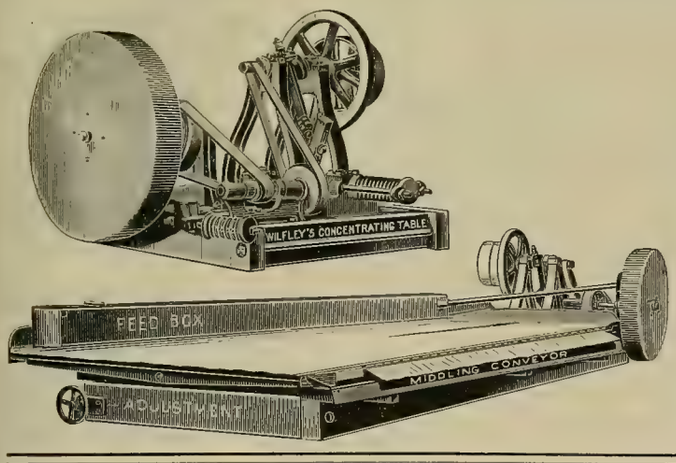
Improved Black Hawk Ore Breaker.

OUR PATENT HOT BLAST APPARATUS for all Smelting Furnaces is a Success. A great economizer of fuel, and enlarges capacity of furnace.



Standard Silver-Lead Water Jacket Smelting Furnace.

Equipped with Arch-Bar System of Mantles, insuring rigid and strong walls. No Cracks.



The Mine and Smelter Supply Co.,

. . . DENVER, COLORADO, . . .

ARE SOLE AGENTS FOR THE

Wilfley Concentrating Table,

And claim for it BETTER work than any Concentrator made, with a capacity of from 15 to 25 tons per day of 24 hours. It is simplicity itself. No moving belts or intricate parts. Anyone can learn to operate in an hour.

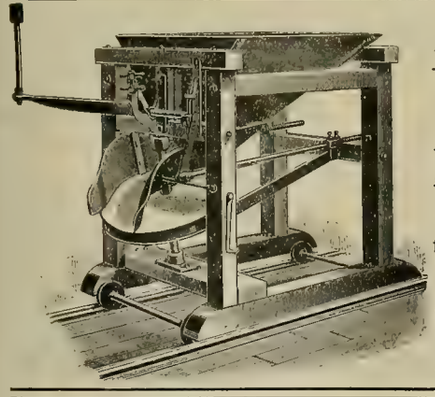
For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Col.; M. E. Smith Concentrator, Golden, Col.; Mary Murphy Mine, St. Elmo, Col.; W. E. Renshaw, Mayflower Mill, Idaho Springs, Col.; W. H. Bellows, Boyd Mill, Boulder, Col.; H. E. Woods, Denver, Col.

ROMLEY, COLO., Jan. 19, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Answering yours of the 5th inst., would state that after a thorough trial we have discarded seven Woodbury Tables and two Johnsons and adopted the Wilfley Concentrating Table, which we think up to date is the best table in the market, so far as our knowledge is concerned. Yours very truly, [SIGNED] B. B. MORLEY, M'g'r Golf M. & M. Co.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

PRICE, $450.00.



Millmen! Investigate This.

POSITIVE FEED. MINIMUM POWER.

Bolthoff Improved Challenge Automatic Ore Feeder.

The only revolving disc feeder, made without gears or clutches. Feeds wet or dry ore; slow or fast. Is operated by a Friction Band. We have other valuable stamp mill improvements.

WHEN WRITING FOR CIRCULARS AND PRICES MENTION THIS PAPER.

Hendrie & Bolthoff M'f'g Co., DENVER, COLORADO.

"It is character, not circulation, that some advertisers want." Very well. The MINING AND SCIENTIFIC PRESS has both.

INVENTORS, Take Notice!
L. PETERSON, MODEL MAKER,
226 MARKET ST., N. E. Corner Front (Up Stairs), SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential*.

Market Reports.

The Markets.

SAN FRANCISCO, April 1, 1897.

Business continues quiet but not more so than usual at this season of the year. Jobbers report that while trade is quiet it is steadily picking up with the outlook favorable to a large increase in the volume of goods over any previous season. It is thought that the call will be more pronounced when the crop season advances far enough to give assurances of large outturns. The impression prevails that there will be quite an increase in the call for harvest machinery the coming season. We are informed that considerable figuring is being done on new work for structural, mining and railroad purposes. The belief prevails that more work will be turned out this year than there was in 1896.

The local money market continues very easy, with more idle money coming out for investment. It is stated that rates are being shaded. There is not much demand for funds except from importers who wish to take imports out of bond. This continues to keep the premium on Eastern exchanges well up, considerably higher than rules at this time of the year. Those in position to know believe that this coming crop season there will be a freer demand for money than has obtained for several seasons past. This opinion is grounded on the present outlook, favoring large crop estimates for both grain and fruit, and, if realized, considerable money will be required to move them. From New York our advices continue to report an easy market in the face of heavy payments for goods withdrawn from warehouse. This, doubtless, is due to no large speculative movement in anything outside of wools, and also to free exports of merchandise and farm products. Sterling bills have advanced slightly, which indicates remitting to Europe for goods, and probably also that Europe is selling American securities, owing to the United States Supreme Court's decision—a case bearing against railroad combinations and similar organizations. In London the money market is easy, owing to large payments by the Bank of England on Japanese and other accounts. At other money centers war rumors affect the market.

New York Silver Prices.

NEW YORK, April 1. — Following are the closing prices for the week:

	—Silver in— London.	N. Y.
Friday	28¾	62¾
Saturday	28¾	62¼
Monday	28⅝	62¼
Tuesday	28 7-16	61⅞
Wednesday	28⅝	61 11-16
Thursday	28 7-16	62

	Copper.	Lead.	Iron.	Tin.
Friday	10 75@12 00	3 40	10 00@12 50	13 30
Saturday	11 70@11 90	3 40	10 00@12 50	13 25
Monday	11 70@11 85	3 40	10 00@12 50	13 25
Tuesday	11 70@11 80	3 40	10 00@12 50	13 20
Wednesday	11 70@11 75	3 40	10 00@12 50	17¼
Thursday	11 70@11 75	3 37½	10 00@12 50	17½

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	20c Prem
New York Telegraphic Transfer	22½c Prem
London Bankers' 60 days	$4.86½
London Merchants	$4.85
London Sight Bankers	$4.89
Refined Silver, per oz., 1000 fine	62¼
Mexican Dollars	49½@50

SILVER.—There has been a steady declining the past week with the close reported steady and firmer at home and abroad. The action of Japan against the white metal and a bill introduced into Congress to return silver certificates and sell the bullion on hand have an unfavorable influence. The London market is said to be exceptionally weak, while at New York they are inclined to sell short even at the lower prices now ruling. It may be that the markets will recover slightly when the policy is known of the present administration towards getting support for international bimetallism and also its opposition against any measure to sell the supply now on hand.

MEXICAN DOLLARS.—The market has sold lower, in sympathy with the decline in silver. The demand in our market is light.

QUICKSILVER. — The Mexican steamer took out 135 flasks. The market holds to strong figures, with odds and ends about cleaned up. New York and London advices report the market working up to the last advance. Nearly all outside holdings have been cared for.

Our market is quoted at $40 for domestic consumption.

COPPER.—The market has sold lower at the East and in London. The decline was indicated last week. It is due to a slow demand from consumers, no speculative inquiry, continued liberal production and stocks increasing. When the spring demand sets in and consumers' supplies are worked down it is quite likely that better prices will rule.

The local market is quoted as follows:

Ingot, jobbing	14½@—
Ingot, wholesale	—@13¼
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17c

LEAD.—The market holds to fairly steady prices. The consumption in this country is steadily increasing.

Our market is quoted in jobbing lots as follows:

Pig	4 00	@	4 25
Bar	—	@	4 50
Sheet	5 62½	@	6 12½
Pipe	4 87½	@	5 37½

SHOT.—The market is steady with only a fair jobbing demand reported.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs			$1 35
Drop, B and larger sizes,	"	"	1 60
Buck, Balls and Chilled, do,	"	"	1 60

TIN.—The markets at the East and abroad have shaded off slightly for pig. In our market pig is easy, with continued cutting in prices of American. The consumption is quite active.

We quote as follows in a jobbing way:

Pig, per lb	14¼c@ —
Plate, I C coke, heavy, per box	$4 05@ 4 15
" " " light, "	3 95@ —

BORAX.—Shipments to the East by rail and water are quite free. The market is steady.

The market is quoted as follows:

Refined, in car lots	4¾
Refined, in sacks	5¼
Powdered, in car lots	5
Concentrated, "	4½

POWDER—The market is steady.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17½c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

IRON.—There is nothing new to report in our market. The consumption seems to be steadily increasing. Our foundrymen, as a rule, have good stocks on hand. The East reports continued activity, but at no advance in prices. Heavy shipments continue to be sent abroad.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—The market is practically unchanged. For foreign the tone seems to be firm for spot, on passage and early shipment. Receipts have been lighter the past week.

We quote as follows:

SPOT FROM YARD—PER TON.

Wellington	$8 00@— —
Greta	6 00@ 6 50
Nanaimo	6 50@ 7 00
Cuman	5 50@ 6 00
Seattle	5 50@ 6 00
Coos Bay	—@ 4 75
Cannel	8 00@— —
Egg, hard	12 00@13 00
Wallsend	6 50@— —

TO ARRIVE—CARGO LOTS.

Australian	5 50
Liverpool Steam	6 25
Scotch Splint	— —
Cardiff	6 25
Lehigh Lump	9 00
Cumberland	13 00
Egg, hard	10 00
West Hartley	6 50

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

ANTIMONY.—The market is steady.

Our market is quoted at 7⅛@8⅛c in a jobbing way. New York mail advices quote 7½c for Cookson's, 7@7⅛c for Hallett's and 7c for Japanese.

NAILS.—Notwithstanding the East reports advancing markets, ours is unchanged.

Wire, carloads, basis per keg	
" jobbing, " "	$2 25
Cut, carloads, " "	
" jobbing, " "	2 10

SPELTER.—The market is weaker. The East reports more offering.

We quote our market in a jobbing way at 5 cents a pound.

NICKEL ANODES.—The markets here and at the East are barely steady.

PLATINUM.—Dealers report a slow inquiry.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC.—The market is steady at quotations.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM. — The market is steady.

We quote in jobbing lots at 50 cents per pound for ingots.

BISMUTH.—There is a slow inquiry.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is slightly easier.

We quote in a jobbing way at 70 to 75 cents per pound.

Chemicals.

In our market there is nothing new to report. Business seems to be picking up, although it is still slow. Tariff agitation has somewhat of an unsettling influence, but the feeling prevails that on nearly everything higher duties will prevail.

BONEASH.—The market is unchanged.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is reported slow but steady at 2½c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is quiet but steady at $1.70 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a fair demand at 2½c a pound from stores.

NITRATE OF SODA.—Advices from the East report stiffer prices. With us no change is reported.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported steady from store at 6½c per pound in carboys.

SULPHURIC ACID.—The demand is fair. We quote in a jobbing way at 1½c per lb for 66%.

BLUE VITRIOL.—Our market is steady, but dull.

We quote in a jobbing way at 4½c per pound.

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Deling't and Sale.	Secretary.
Alpha Con M & M Co, Nev	18	5c	Mar 2.	Apr 5..Apr 27	C E Elliott, 309 Montgomery
Belcher S M Co, Nev	54	25c	Mar 2.	Apr 6..Apr 27	C L Perkins, Mills Bldg
Brunswick Con G M Co, Cal	11	3c	Mar 22.	Apr 23..May 15	J Stadfeld
Channel Bend M Co, Cal	7	2c	Mar 22.	Apr 24..May 17	J P Langhorne, 39 Sutter
Con Cal & Va M Co, Nev	8	25c	Mar 8.	Apr 13..May 3	A W Havens, 309 Montgomery
Confidence S M Co, Nev	28	30c	Mar 12.	Apr 16..May 7	A S Groth, 414 California
Con Imp M Co, Nev	38	1c	Feb 16.	Mar 23..Apr 13	C L McCoy, Mills Bldg
Crown Point G & S M Co, Nev.	70	20c	Mar 24.	Apr 28..May 19	James Newlands, Mills Building
Hale & Norcross S M Co, Nev.	111	10c	Mar 20.	Apr 23..May 14	R R Grayson, 331 Pine
Horseshoe Bar Con M Co, Cal.	7	10c	Mar 8.	Apr 17..May 8	D M Kent, 330 Pine
Jamison M Co	9	5c	Nov 27.	Apr 24..June 19	Sam W Cheyney, 120 Sutter
Marguerite G M & M Co, Cal.	5	10c	Jan 14.	Feb 25..Apr 8	Chas Peach, 237 Twelfth
Mexican G & S M Co, Nev	56	20c	Mar 3.	Apr 7..Apr 29	C E Elliott, 309 Montgomery
Mineral Hill M & S Co, Cal	1	5c	Jan 4.	Feb 15..Apr 13	Chas Peach, 210 Sansome
Occidental Con M Co, Nev	26	10c	Feb 10.	Mar 16..Apr 6	A K Durbrow, 309 Montgomery
Potosi M Co, Nev	47	20c	Mar 10.	Apr 14..May 5	C E Elliott, 309 Montgomery
Sierra Nevada S M Co, Nev.	112	25c	Mar 2.	Apr 6..Apr 26	E L Parker, 309 Montgomery
Sulphur Bank Q M Co, Cal	5	25c	Mar 23.	May 3..June 3	T Wintringham, 306 California

Mining Share Market.

SAN FRANCISCO, April 1, 1897.

The market shaded off up to Monday, when a steadier tone set in, with shorts filling. At the decline there was considerable stock thrown out by margin holders. On Tuesday and Wednesday there was outside buying on the long side, which strengthened values slightly. The buying was largely due to points of a pending upmove and advices from the Brunswick lode that in Chollar and Occidental there was an improvement, in the former in the winze which is being sunk from the 200-foot level and in the latter in the work on the 500-foot level. For the past few days there have been more sales recorded than for several weeks past. Considerable of the sales recorded are said to have been cross orders for the purpose of inducing outsiders to buy at stronger prices. Present low prices do not offer any inducements to shorts; besides this, it would be hard to place a large line. Notwithstanding the unfavorable condition of the share market, it is conceded that for some time past there has been a steady absorption of shares by strong parties at the declining prices. Even with this buying in evidence, it is stated by the better informed that lower prices will rule before a good-sized deal is engineered; but in the interim there is liable to be a fair-sized rally. This opinion is based on the work in the mines, assessments levied and to be levied, and the general condition of business on this coast and at the East not being such as to encourage a belief that successful unloading at high prices can be engineered. Evidently the market for a big move is waiting for better times. Standard Con. shares have been inactive but steadily held, owing to the near approach of the spring months, when more active work can be resumed. The outlook for this mine is quite promising, provided it is honestly managed.

The news from the Brunswick lode is quite encouraging. In Occidental they are in 10 feet on the 550-foot level, which assays from $8 to $12 a ton gold. If this should prove to be free milling, it ought to pay something above cost of extraction, hauling and milling. On the 850-foot level the ore is still low-grade. In Chollar they are sinking a winze from the 200-foot level. At last mail advices they were in 4 feet of ore, giving $80 a ton. We are not advised if this is a new find or the ledge upon which they have been working. They continue to take out and mill ore. The south drift on the 500-foot level is being pushed ahead. They are in a total distance of about 175 feet. Within the next ten days a crosscut will be started to run for the downward continuation of the ore found above. The work in Savage, Best & Belcher and Gould & Curry is practically the same as reported last week, with no change in material encountered, or, at least, official letters do not report any.

Official letters from the Comstock mines are said to be quite satisfactory to the pools that are buying shares and freezing outsiders out of their holdings by assessments, and no encouraging advices are allowed to be reported by those who are supposed to be in charge. The muddle over the Hale & Norcross ownership has not as yet interfered with work in the mine, but suit brought for possession by the reported Grayson-Hayward combination is expected to stop work. It looks very much as if they were not ready to show up the ore which the Fox combination has contended exists in the mine. From the Alta group nothing new has come to hand. The work seems to be of a procrastinating character to kill time and indirectly "kill off" outside holders. Overman took out a few tons of ore the past week, just enough to make a showing. The work in this mine and California is unchanged. They are still after Belcher shares for no mention has yet been made of the reported strike some time ago, of a valuable body of ore. Official letters do not report on what level work is being done. From Segregated Belcher nothing new comes to hand. It looks as if news was being suppressed, for official letters do not conform to the law. In Crown Point they are working on several levels but with indifferent success so far as finding ore, but it has the effect of manipulators finding more shares at lower prices. From Yellow Jacket nothing is allowed to leak out. In Confidence they are still working on the upper levels. Work is still continued on Challenge, Confidence and Con. Imperial joint cross-drift. They expect to strike the west lode sometime in this month, unless work should be ordered stopped. In Alpha they are fooling around the 500-foot level. Work is continued by Bullion in the north drift heretofore reported. In Potosi they are preparing to stope ore from workings on the tunnel level. In Hale & Norcross work is confined to the 900-foot level. No work is being done by Chollar. The work in Savage, Gould & Curry and Best & Belcher is practically the same as reported last week. Both private and official advices from Con. Virginia do not afford any comfort to stockholders. Unless some ore is struck soon the shares are

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likely to sell below present prices with assessment added. Work is reported on the 1000-foot, 1550-foot, 1650-foot and 1750-foot levels. It is not materially changed from our last week's report. There is nothing to warrant that much ore is intended to be struck soon. The Ophir letters reports work to the west on its 1000-foot level and upraising from the central tunnel. They passed through streaks of quartz assaying from $2 to $15 a ton. In Mexican they are pushing slowly to the west on the 1000-foot level. The material is unchanged. Considerable work is being done in Union both east and west. The material encountered looks well but does not "pan out" well according to official advice. In Sierra Nevada work is confined to Layton tunnel. No change is reported from Utah. In Andes they have made surface connection. Work has been resumed on the 175-foot level.

The following illustrates the changes of the week:

MINES.	Mar. 25.	Apr. 1.
Alpha		
Alta Consolidated	$ 02	$ 01
Andes	17	
Belcher		11
Best & Belcher		64
Bodie		
Bullion		
Challenge	33	38
Chollar	1 25	1 15
Confidence		
Consolidated California and Virginia		1 20
Consolidated New York		
Crown Point	13	18
Exchequer		
Gould & Curry	30	29
Hale & Norcross		88
Justice		
Mexican	26	23
Ophir	90	91
Overman		
Potosi	39	34
Savage		26
Sierra Nevada	24	22
Union	28	
Utah	06	
Yellow Jacket	25	27

San Francisco Stock Board Sales.

SAN FRANCISCO, April 1, 1897.

9:30 A. M. SESSION.

300 Belcher	14	50 Mexican	23
200 Best & Belcher	64	200 N. G. & C	08
300 Challenge	38	300 Ophir	91
100 Chollar	1 15	400 Potosi	34
100 Con Cal & Va	1 20	100 Savage	26
100 Crown Point	18	200 Yellow Jacket	27
100 Gould & Curry	29		

SECOND SESSION—2:30 P. M.

200 Ophir	90	200 H. & N	88
100 Con Cal & Va	1 20	1150 Sierra Nevada	22
100 Savage	26	300 Alta	01
100 Mexican	22		

Rainfall and Temperature.

The following data for the week ending 5 A. M., March 31, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week	Total Seasonal Rainfall to Date	Total Seasonal Rainfall Last Year to Same Date	Average Seasonal Rainfall to Date	Maximum Temperature for the Week	Minimum Temperature for the Week
Eureka			33.97	37.19		
Red Bluff	.20	22.84	16.19	22.33	80	66
Sacramento	1.20	16.73	16.97	17.37	86	72
San Francisco	1.43	22.30	15.37	20.87	69	59
Fresno	.24	10.22	5.37	6.21	82	70
San Luis Obispo	.42	20.52	15.41		86	78
Los Angeles	.28	16.71	8.88	10.23	80	78
San Diego	.04	11.60	5.68	9.57	80	70
Yuma		5.35	.88	2.88	90	86

OFFICE OF THE HALE & NORCROSS SILVER Mining Company, Room No. 11, San Francisco Stock and Exchange Building, No. 331 Pine street, San Francisco.

To the stockholders of the Hale & Norcross Silver Mining Company and to all others concerned:

Notice is hereby given that, pursuant to the consent, in writing, of the holders of two-thirds of the capital stock of the Hale & Norcross Silver Mining Company, duly filed in the office of said company, the principal place of business of said Hale & Norcross Silver Mining Company has been changed from Room No. 3 of the San Francisco Stock and Exchange building, No. 331 Pine street, in the City and County of San Francisco, State of California, to Room No. 11 in the same building, where the business of said Company will be hereafter transacted. This notice is published in accordance with Section 321 of the Civil Code.

Dated March 19, 1897.

By order of the Board of Directors.

R. R. GRAYSON, Secretary.

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by the hydraulic process from T. C. Cox and W. C. Pidge, in the Philadelphia mines, near Columbia, Tuolumne Co., to deposit tailings in Rose and Eagle creeks, and from F. G. Curnow and others, in the Little Grass Valley Mine, near Columbia Hill, Nevada Co., to deposit tailings in an old reservoir, gives notice that a meeting will be held at room 59, Flood Building, San Francisco, Cal., on April 19, 1897, at 1:30 P. M.

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Assessment Notices.

CONSOLIDATED CALIFORNIA AND VIRGINIA Mining Company.—Location of principal place of business, San Francisco, California. location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the 8th day of March, 1897, an assessment (No.) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 47, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 13th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 3d day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room No. 47, Nevada block, No. 309 Montgomery street, San Francisco, California.

HALE & NORCROSS SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of April, 1897, an assessment (No. 111) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 11, 331 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of April, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 14th day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. R. GRAYSON, Secretary.

Office—Room 11, 331 Pine street, San Francisco, California.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9), of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 26th day of March, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on SATURDAY, the 24th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 19th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

STOCKHOLDERS' MEETING.—Notice of Stockholders' Meeting of the Steeple Rock Development Company: In accordance with a resolution passed by the Board of Directors of the Steeple Rock Development Company, a meeting of the stockholders of this company will be held at 3 o'clock in the afternoon on TUESDAY, the 11th day of May, 1897, at its principal office, No. 320 Sansome street, room 24, San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Million Dollars, in four hundred thousand shares, at the par value of five dollars each.

H. PICHOIR, Secretary.

Dated at San Francisco, Cal., March 26, 1897.

STOCKHOLDERS' MEETING.—Notice of Stockholders' Meeting of the Alaska Juneau Gold Mining Company: In accordance with a resolution passed by the Board of Directors of the Alaska Juneau Gold Mining Company, a meeting of the stockholders of the company will be held at 2 o'clock in the afternoon on WEDNESDAY, the 21st day of April, 1897, at its principal office, room 23, 320 Sansome street, San Francisco, to consider and vote upon a proposition to increase the capital stock of this company to Five Million Dollars, in five hundred thousand shares at the par value of ten dollars each.

R. M. MEIN, Secretary.

Dated San Francisco, Cal., March 13, 1897.

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The Monterey Power Company invites bids for putting in its entire plant, dam, flume, wheels, electrical apparatus and pole line from Little River (22 miles south of Monterey City) to Monterey and Salinas City, for the generation and transmission of electrical current of not less than 450-horse power; entire distance being approximately 37 miles.

Bids will be received up to SATURDAY, April 17, 1897, at 2 o'clock P. M., at the company's offices, Monterey City, Monterey County, Cal., where plans and specifications may be seen.

All bids must be accompanied by a certified check for ten per cent of the sum of such bid. Checks to be payable to the company and to be held upon the usual conditions.

By order of the Board of Directors.

F. A. BOTSCH, Secretary.

SEALED PROPOSALS.

Bids will be received at the office of the undersigned until 5 o'clock P. M. on MONDAY, April 5, 1897, for 3000 feet of 6-inch cast-iron pipe, dipped and delivered at the freight sheds in this city, and to weigh not less than 30 pounds to the foot. A certified check, made payable to City Clerk, for an amount not less than 10 per cent of bid, must accompany each bid. The Board of Trustees reserves the right to reject any and all bids.

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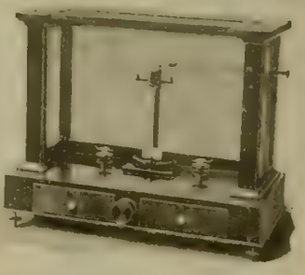
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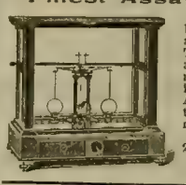
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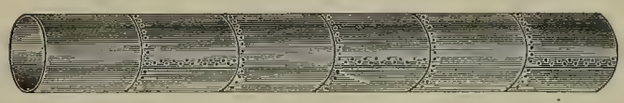
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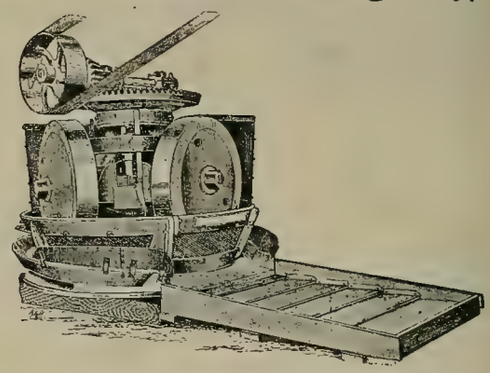
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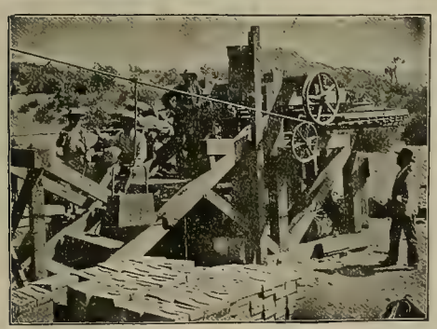
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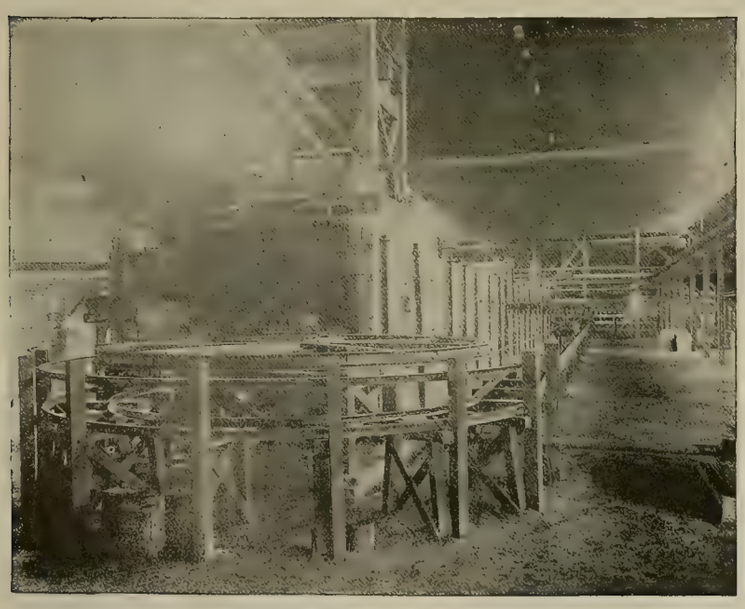
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February 19, 1897.

"Our furnace is now running very nicely indeed, averaging 90 tons per day to 0.10% sulphur, and doing excellent work; in fact, it has improved right along and we are highly pleased with it.

"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

The ROPP FURNACE is now in successful operation at the following reduction works: The Hanauer Smelting Works, Salt Lake City, Utah (one furnace); The Metallic Extraction Co., Cyanide, Colo. (one furnace); The Colorado-Philadelphia Reduction Co., Colorado City, Colo. (three furnaces); The Selby Smelting & Lead Co., Selby, Cal; (one furnace); The Mount Morgan Gold Mining Co., Rockhampton, Queensland (one furnace); and Broken Hill Proprietary Co., Broken Hill, New South Wales (two furnaces).

Catalogue on Application.

MINE BELL SIGNALS. Adopted, Used and in Force in Accordance with State Law.

FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 220 Market St., San Francisco.

MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 1918.—VOLUME LXXIV. Number 15. SAN FRANCISCO, SATURDAY, APRIL 10, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Chrome Ores.

Chrome ore, like quicksilver, is one of the mineral products of the United States mined only in California. Some years ago the shipments from the State were quite extensive. Chrome ore has been produced in California and shipped to the East for nearly forty years. Many people upon discovering a body of chrome ore think it of more value than it really is. The value of chrome ore laid down in San Francisco ready for shipment around the Horn is not over $10 to $12 per ton. A very large proportion of the ores of this State are of low grade, carrying less than 50 per cent. Ore carrying from 50 per cent up only is considered high grade enough to work.

Of late years there has been considerable falling off in the demand for and shipment of California ore. This is to be attributed to several reasons. The main supply from abroad is from Russia and Turkey, within reach of cheap transportation. These ores come into the United States free of duty; they are mined by labor little better than slave· they are often brought over as ballast and the freight is very low. The ores from Smyrna and the Ural mountains are as a rule higher grade than those found in California, within reach of cheap transportation. The ores from the Ural mountains and the Caucasus, which commanded the world's market in 1877, contain from 53 to 55 per cent chromite. In 1877 large deposits were found near Smyrna, in Asiatic Turkey, which were soft and granular in texture, easily mined, not far from a shipping point, contained from 55 to 58 per cent chromite and were comparatively free from silica. Chrome ore in the Black Lake district in Canada has been mined during the past few years and the shipments in 1895 amounted to about 2500 tons.

In the United States the great center of bichromate manufacture is at Baltimore, Maryland, the first deposits in this country having been worked in that State. They are now practically exhausted. The total product of the United States for several years, all from California, has been from 1500 to 2000 tons annually, while the total consumption has been about 5000 tons. The world's consumption is about 80,000 tons, about half of which comes from Turkey.

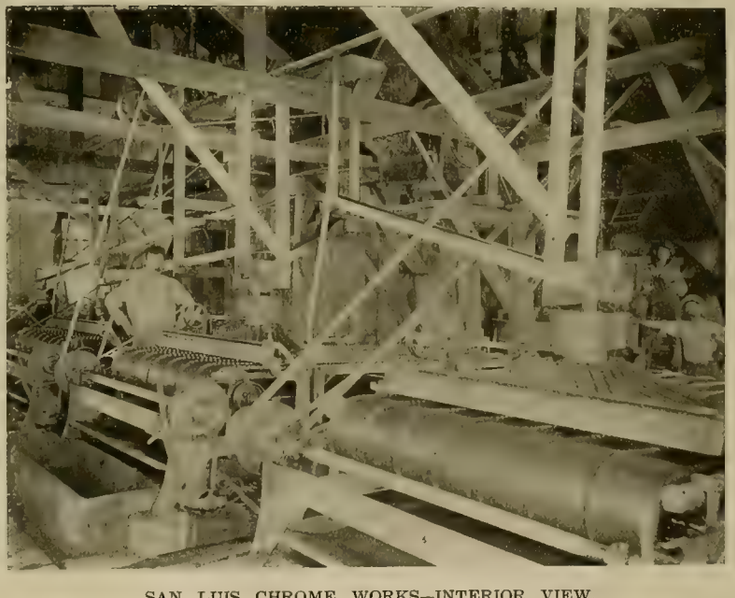
The old firm of Kruse & Euler was for many years in the business of shipping these ores from California, and they received samples of chrome from nearly every county in California. Several of the deposits of the highest grade have been worked out, but many others remain unworked because they are in comparatively inaccessible places, where the cost of transportation prevents their being mined profitably.

It has been suggested that a duty of $2 or $3 a ton on this article would enable this State to furnish the total amount required for consumption in the United States and in time supply much for export.

At the present time chrome is being mined in Tehama, Shasta and San Luis Obispo counties mainly. At San Luis Obispo the San Luis Chrome Company has concentrating works.



SAN LUIS CHROME WORKS—EXTERIOR VIEW.



SAN LUIS CHROME WORKS—INTERIOR VIEW.

THE new law as to locating mining claims passed at the late session of the Legislature will go into effect May 25th. It was published in full in the MINING AND SCIENTIFIC PRESS March 20th. There are so many provisions made as to what shall constitute a valid location that have not been upon the statute books of this State, that it behooves all those who are interested to carefully read the law. Heretofore there has been a great deal of guesswork as to how locations should be made and most of them have been made carelessly, many with resultant litigation. One advantage about the new law is that it may be easily understood by miners without legal advice. The provisions as to what must be done are plain, although they entail upon the locator considerable extra work.

The Law and Veins, Lodes and Mines.

In a brief in a case before the Superior Court of Lake County, Mr. A. H. Ricketts of this city gives some interesting data as to what constitutes a "vein or a lode" or "known mines" in the eye of the law. He says:

"By the term 'veins' or 'lodes,' as used in the mining acts of Congress, is meant lines or aggregations of metal embedded in quartz or other rock in place; both are intended to indicate the presence of metal in the rock.

"But it is not enough that there may be some indications by outcroppings on the surface of the existence of lodes or veins of rock in place bearing cinnabar or other metal to justify their designation as 'known' veins or ledges.

"A 'vein' or 'lode' is not *known to exist* until it has been discovered and *located*—that is, that its boundaries have been specially marked on the surface, so as to be readily traced, and the notice of location is recorded in the usual books of record within the mining district in which it is situated.

"It follows, therefore, that a vein is not 'known to exist' in the law except by an *actual discovery* of the vein *within a given location*.

"The existence of the location is a matter which every one is legally presumed to know. The existence of a 'mine' is not known until ore has been extracted or shown to exist in sufficient quantities and value to warrant extracting within the boundaries of the claim located; until then the location is a 'prospect,' and the mere existence of shafts, tunnels, inclines and stopes on the vein, no matter how extensive such excavations may be, is not evidence of a mine of value; or, in other words, a 'vein' is the work of nature; a 'mine' is the result of man's handiwork in disclosing the mineral contained in the vein.

"Or, in other words, a 'known mine' may be said to be one which is especially recognized by the natural material having been made visible (and productive) through workings or exploration, and not until then is it a 'known mine' within the meaning of the statute; or, again, the term 'mine' is generally equivalent to a 'worked vein, for by working the *vein* it becomes a *mine*, for 'A mine is not properly so called until it is opened; before that it is but a 'vein.'—Astry v. Ballard, 2 Mod. Rep., 193; King's Bench 28 and 29, Charles II.

"And this was the opinion of Lord Coke in his First Inst. 54-b, where he tells us that if a man demise lands and mines, some being opened and others not, the lessee may use the mines opened, but has no power to dig the unopened mines."

The U. S. statutes intend that a "known" mine should be synonymous with an *operated mine*.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Oldest Mining Journal on the American Continent.

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TO THE PUBLIC.

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San Francisco, April 10, 1897.

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The Gold Miners' Convention.

The National Mining Bureau of Colorado has issued a call for an international gold miners' convention to be held in Denver on the 15th and 16th of June next. It is proposed to have in connection with it exhibits of gold ores and a general mineral display. A request is made that State mining bureaus, schools of mines, boards of trade, chambers of commerce, mining exchanges, and all mining organizations co-operate in forming the exhibit, and send delegates. Each county in the mining States, and in the mining districts of British Columbia and Mexico are asked to elect delegates. Governor Adams of Colorado has been named as President of the convention, and Irwin Mahon as Secretary.

It is to be hoped that the Executive Committee of the California Miners' Association will take steps to see that this State is properly represented. Of late years Colorado has done more than California to interest Eastern and European capital in the development of mining, and especially gold mining, in the West, and the influences of such a gathering as proposed should be large in that direction.

Yet in other respects the proposed convention should be of still greater value to those who do not have mines to sell, but desire to keep in touch with all that is new and best in the working of mines. Coloradans have learned much from California about mining, and vice versa. It would seem that no miner could attend such a meeting without bringing back much of value to himself and to others. A similar convention held annually and in different mining centers in the West would be a valuable educational institution.

The Surplus Population of New Mining Camps.

In nearly every new mining district in the West there is a greater surplus of unemployed men than in the older camps. As a general rule, there is less demand for labor in these new districts for some time after their discovery, and until capital comes in in sufficient quantity to develop them. A skilled prospector needs little advice as to where he should go; he has means of finding out and knows well how to take care of himself under the most adverse circumstances. This may be said of most miners of long experience; but the men who make up the large surplus of the unnecessary population in the new mining camps are nearly all men of smaller experience, and, to a certain extent, useless. Hundreds of men have gone to the Randsburg district who have no knowledge of mining, but imagine that they can find something to do. So it is with the camps in British Columbia; so it is with Alaska. Warnings are continually sounded through the local papers published in all those districts to people to stay away. Probably the best advice that could be given to those who earnestly desire to learn something of mining is to choose the older camps, for in these there are more opportunities for unskilled miners than in the new districts, where men are compelled to depend so much more upon their own resources.

The California Legislature and the Mining Industry.

Altogether, the mining industry has fared very well at the hands of the late California Legislature. Heretofore there has never been any attention worth speaking of devoted by Legislatures to the mining industry, and as a result there has been considerable confusion and resultant litigation, particularly as to location rights.

Last October the MINING AND SCIENTIFIC PRESS suggested that the California Miners' Association take up this matter, and it did. As a result, the foundation has now been laid for a good set of mining laws for California. In all the scandals connected with the last session of the Legislature there was no sign of anything of the sort attached to any of the legislation connected with the mining industry. The members all appreciated the importance of the revival of mining, and seemed willing to do whatever they could to help it. No appropriations were asked. Miners are self-reliant. All that they ask is permission to use the machinery of the State government only when it is absolutely necessary.

Of the bills passed it may be said of some of them that they are experimental and may need revision at the hands of the next or some future session; but in the main they all tend in the right direction, and enough good has been done to enable the Miners' Association to, with very little work, procure amendments or additional laws from the next session. Of those passed that prescribing the manner of locating mining claims is probably of the most importance to the miner. The bill was published in the MINING AND SCIENTIFIC PRESS March 20th. As to Section 3, which provides that within sixty days from the date of the discovery of the vein or lode, or of the location of a placer claim, the locator must perform $50 worth of labor in developing the property, many communications with adverse criticisms have been received. It is claimed that the time allowed for the performance of the work is too short. It is pointed out that in some of the higher altitudes storms will often prevent complying with this, especially in the beginning of winter or in the early spring. There is much to be said in favor of an extension of the time allowed.

Mr. Soward's bill as to recording notices—an amendment to Section 1159 of the Civil Code—bears upon the bill referred to above, and is as follows:

Judgments affecting the title to or possession of real property authenticated by the certificate of the clerk of the court in which such judgments were rendered (and notices of location of mining claims), may be recorded without acknowledgment, certificate of acknowledgment, or further proof. The record of all notices of location of mining claims heretofore made in the proper office without acknowledgment, or certificate of acknowledgment, or other proof shall have the same force and effect for all purposes as if the same had been duly acknowledged, or proved and certified as required by law. Affidavits showing work or posting of notices upon mining claims may also be recorded in the Recorder's office of the county where such mining claims are situated.

Another bill passed amends Section 15 of the act of March 30, 1868, so that in town lands granted to unincorporated towns in this State by the act of Congress of March 2, 1867, within six months after the plat required by the act has been filed, if there shall remain any unclaimed land, any one discovering gold upon it shall be considered a preferred purchaser.

An act recommended by the California Miners' Association, and passed, provides that the directors of any mining corporation shall not sell, lease, mortgage or otherwise dispose of any mining ground, or purchase or obtain in any other way except by location, any additional mining ground, unless such act be ratified by at least two-thirds of such corporation.

Another act passed amends the statute of March 30, 1874, for the better protection of the stockholders of mining corporations formed under the laws of the State of California, so as to provide that only such corporations as have their stock listed on a public stock exchange must file and keep for the inspection of the other holders reports of the secretary and superintendent, and that these reports shall be made monthly, instead of weekly, as under the old act.

An act repealing the act of March 28, 1874, and acts amendatory to it, providing for the sale of mineral lands in the school sections 16 and 36 granted by the Federal Government, was discussed in these columns while it was before the Legislature. Those acts were declared void by the decision of the United States Supreme Court, and their presence on the statute books have resulted in considerable confusion and in many cases have led to no little extortion and blackmail.

The debris bill reappropriates $250,000 appropriated in 1892, to be expended in conjunction with a like amount provided for by the Federal Government for building restraining dams.

While not a mining bill, the drainage Act appropriates $300,000 for the improvement and drainage of navigable streams—particularly the Sacramento and its tributaries—and should do much toward clearing a way for reopening of hydraulic mines.

Of the measures proposed, and which failed of passage, several were of considerable importance. One was Mr. Caminetti's bill proposed by the MINING AND SCIENTIFIC PRESS last October, relating to the liens of miners upon mining claims. Another was Senator Prisk's bill, providing for the appointment of a mining inspector. Another was a bill to amend Section 605 of the Penal Code, relating to the removal, defacing or altering land marks; and another was a bill proposed by this paper to amend and give wider scope to the Act providing for the prevention of robbery of bullion, ore and other valuable material from mines.

The New Road Bills.

The cost of transportation in nearly all the mining districts of California is a very heavy item of expense to the owners of mines. During the past winter the MINING AND SCIENTIFIC PRESS has often called attention to the heavy losses incurred through failure to take in supplies ordered. Many mills that were ordered in October, November and December, and whose stamps should now be crushing ore, are lying along the roads between the railway and their destination. The losses incurred should be sufficient lesson to the people, who are themselves responsible in great measure for this condition of affairs. The Legislature has passed a number of laws with a view to improving the roads in all parts of the State. Yet unless the voters themselves are more careful than they have been in the past to choose honest and intelligent representatives to care for the highways these laws will accomplish little.

It would seem that in the mining counties the local miners associations could do much good in this respect, and certainly it is within their province to make the attempt. Candidates for office might be pledged to do their simple duty in carrying out the laws honestly. Certainly no politician in the mining district would care to offend such an organization as the Miners' Association. The work done so far by the State in legislation and by many counties in improving the roads has been through the influence of the bicycle clubs and similar organizations. Little can be expected in the way of influence from this source in the mountains, and it behooves the miners to take the matter up.

The bills passed by the Legislature provide a general law for the State, dividing the roads into three classes—State, county and district. The State highways should, in a measure, fill a great want for large arteries leading to the more important districts away from railroad communication. Good work done upon them will have a salutary effect upon the county and district authorities in the way of object lessons.

Altogether the machinery is provided for obtaining good roads, but it remains with those directly interested to see that it is honestly and intelligently used.

Concentrates.

THE Anglo-Mexican Company of Mexico reports for February an output of $41,960.

A 5-STAMP mill is to be erected on the Conant mine, at Harrison gulch, Shasta county, Cal.

THE Comstock, Nev., paid $60,415.16 to employes in March, 1897, $2000 larger than in February.

THE question of dividing Lincoln county, Nevada, is to be submitted to the voters at the election in 1898.

THE Garfield-Virginia mine, in Tuolumne, Cal., has been bonded to C. M. Cross of San Francisco for $25,000.

THE next meeting of the B. C. Association of Mining Engineers will be held at New Denver about June 1st.

A BILL has been introduced in Congress for the establishment of a Government assay office at Baker City, Oregon.

THE export of gold from British Guiana from January 1 to March 1, 1897, was valued at $218,525, against $192,678 for 1896.

THE U. S. Debris Commission has revoked the permit granted the S. P. V. G. M. Co., Cherokee, Butte county, Cal.

THE Russian gold reserve in the Treasury and State bank, according to an official statement March 28th, was 808,500,000 roubles.

SUPERINTENDENT DOGGETT of the San Francisco Mint has an order from Director Prescott for the coinage of 800,000 silver dollars.

LAST week a blast of 70,000 pounds of powder was fired at the Morena dam in San Diego county and 100,000 tons of rock dislodged.

SAN FRANCISCO men are negotiating for the purchase of the Lucky Bill, near the Enterprise mine, near Fresno Flats, California.

A THOUSAND carloads of mining timbers, machinery and supplies have been received at Kingman station, Arizona, since the first of January.

THE monthly reports of mining companies will be filed on the second Monday of each month, instead of the first Monday under the old law.

WHAT are represented to be extensive bodies of high-grade copper have been discovered on the Mashel river, thirty miles south of Tacoma, Wash.

THE United Globe Copper Company of Arizona propose to erect larger hoisting works on the Hoosier shaft and increase the output of the mines.

ACCORDING to the *Arc-Light*, the owners of the Lightner mine, adjoining the Utica, at Angels Camp, California, propose to erect a 20-stamp mill.

BORING for oil at Richland, San Diego county, Cal., has been under way some time, and last week at a depth of 300 feet signs of petroleum were found.

THE $5000 mining inspector bill which passed both houses of the last California Legislature, was one of the measures pocket-vetoed by Governor Budd.

ROBERT G. SMITH has brought suit in Salt Lake to recover a one-fourth interest in the Ben Hur Gold Mining Company's property, in White Pine district, Nevada.

THE Butte mine, in the Rand district, Kern county, Cal., has, according to a press dispatch, been sold to Wilson, owner of the Wilson House at Butte, Montana, for $60,000.

THE Arizona *Republican* announces that Rochester, New York, capitalists offer to erect a large smelter at Phœnix if the city will grant them sufficient land for the plant.

ACCORDING to the *Spokesman-Review* of Spokane, Washington, ore has been found in the Anchor mine which carries nickel, cinnabar, copper, gold, some silver and cobalt.

THE owners of the April Fool mine at De Lamar, Nevada, who have been paying wages of $3.50 per day, have issued a notice that after the first of April they will pay $3 per day.

AN English syndicate that has a bond on the Commander mine at Rossland, B. C., at $250,000, has called for and been granted an extension of time of twenty days, or until May 10.

A NEW pump has been forwarded to the Thistle Shaft, near Gibsonville, Plumas county, Cal., and the work of clearing the big drift mine of water will be commenced in a few days.

AT Harrison gulch, in Shasta county, California, a tunnel, now in 400 feet, is to be run 4500 feet through the Conant and the Hurst & Fowler locations in the Lucky Baldwin locations.

LEAD during the week sold as high as $3.35 per 100 pounds—a higher figure than it has reached before since August, 1895, when the price was $3.37½. Since that date it has gone as low as $2.50.

AT Mercur, Utah, the management of the Brickyard property announce that as soon as the snow has gone the work of building a mill with a capacity of 200 tons daily will be commenced.

THE Reid mines, in Old Diggins district, in Shasta county, Cal., have been bonded to W. H. Clendenin, E. A. Reid and J. M. Salnave, owners, and A. B. Paul and Samuel Sandry, for $60,000.

THE value of the products of the lode mines of the Kootenay, British Columbia, for the quarter ending March 31 was $2,151,858.58. The total product for the year 1896 was $4,257,179.

IN British Columbia a means of beating the law as to assessment work on locations is being worked in some districts by a system of relocations similar to that in vogue in places on this side of the line.

A PRESS dispatch from New York reports that English capitalists are endeavoring to secure control of the Butte & Boston copper properties in Montana and the Old Dominion copper mines in Arizona.

THE Provincial Legislature of British Columbia has passed an act forbidding the employment of Japanese or Chinese. The Chinese had already been barred from employment, to a certain extent, in the mines.

THERE is a small army of prospectors in Rossland, B. C., waiting for the snow to melt so that they can go into the mountains. Many of them will go farther north than last season into the Salmon and North Fork districts.

THE owners of the New Idria mines are asking the Fresno county, Cal., authorities to build a few miles of road that will give them connection to ship their product by way of Mendota. At present shipments are made by way of Tres Pinos.

THE world's production of manganese ore is about 500,000 tons annually, of which it is estimated 250,000 tons come from Russia, 43,000 from Germany, 36,000 from Chili, 33,000 from France, while only about 15,000 tons are produced in the United States. In this country manganese ore can be delivered at New York from Cuba or Russia cheaper than from Arkansas or Colorado. There is imported about 90,000 tons annually.

THERE are estimated to be between 2000 and 2500 men working along the banks of the Snake river between American Falls and Bliss in Idaho placer mining. The work is done on a small scale and the men make from $1.50 to $10 a day each.

ARIZONA papers are advocating big tunnels for tapping some of the mining districts of that Territory. It is claimed that in many places in Arizona large numbers of veins could be cut from 1000 to 1500 feet below the apex by tunnels 3000 feet long.

PRITCHARD MORGAN, a member of the English Parliament, is in China and was lately in consultation with Li Hung Chang in regard to developing mines. Mr. Morgan has done considerable work in endeavoring to develop gold mines in Wales.

VADNER & FRISBEE at Bingham, Utah, have leased ground near the Bingham Copper Company's mines with the intention of constructing a precipitating plant to treat the sulphate of copper in solution seeping from mineral veins of that locality.

A WAGON ROAD to connect Hay Fork, in Trinity county, with Redding, Shasta county, Cal., is about to be built. The Board of Supervisors of Shasta county last week received bids for building that county's section, and they ran from 76 cents a rod to $2.24 per rod.

LAST week occurred the first strike in the history of Tuolumne county. The manager of the Soulsby mine announced that there would be made a reduction of 50 cents per day in wages and fifteen men walked out. Later all the men resumed work at the old wages.

AT the first general meeting of the New Goldfields of British Columbia, Limited, in London, the chairman stated that he had dispatched a man to the Fraser river property to erect a new dredger. The directors are negotiating for the erection of smelting works in British Columbia.

MINERS should not be fooled by proffers of "write-ups" published on a coin basis, notoriously incorrect, and of no value. As the Redding, Cal., *Searchlight* says: "The best write-up that the resources of any county can have is the enterprising weekly that the community supports."

THE treaty with Great Britain providing for an arbitration tribunal for the settlement of the disputed Guiana boundary has been unanimously ratified by both houses of the Venezuelan Congress. This will give an impetus to many proposed schemes for exploring the mining districts of both countries.

WHATEVER may be the sins of the last California Legislature, be it said to its credit that it did a great deal for the mining interests of the State, and that, too, without the shadow of a suspicion of unworthy influence, the need of such legislation being generally recognized and universally understood.

IN the Rand, South Africa, on the Robinson Deep, the shaft at 2390 feet has struck the south reef, which is 6 inches wide and assays five ounces per ton. This same reef at 1800 feet was 1 foot wide and assayed three ounces per ton. The shaft at 2390 feet in depth was 3900 feet from the outcrop.

SAMUEL NEWHOUSE, and his European associates, last week made a final payment of $91,000 and acquired full title to the Highland Boy group of claims at Bingham, Utah, upon which they have run 500 feet of tunnels, shafts and drifts. The erection of a mill with a capacity of 200 tons daily will be commenced immediately.

F. R. BAKER and C. H. Ross of Tacoma, Wash., have incorporated the Union Milling and Smelting Company; object, to apply the hydrocarbon principle in smelting. This is an old principle in the science of metallurgy. The manner in which it is to be applied by the new corporation is patented by Barron Bros. of Tacoma, Wash.

A GROUP of twelve coal claims in San Carlos reservation have been developed slightly by Hendersen and Crowe, who sunk a shaft 90 feet, which cut two seams of coal, 36 and 66 inches in thickness respectively, which are reported to be of good quality. Further work will not be done until the fields are thrown open by the Government.

THE Black Bear Quartz Mining Company of Siskiyou county Cal., which has gone through many vicissitudes in its long history, is applying for patents for its claims located over thirty years ago and from which between two and three millions have been taken in gold. A much smaller proportion of mine owners in California have applied for patents than in newer districts in other States.

THE owners in London of the Banner mine in Butte county, California, have formed a new company—the Consolidated Gold Mines of California, Limited, to purchase and work the Long's Bar, Clark, Coffee and Hedges. The owners will receive in payment £100,000 in paid-up shares out of a total of £250,000. These properties, as well as the Golden Feather, Morris Ravine and Golden Gate, are managed by George H. Evans, with headquarters at Oroville.

A SHORT TIME ago the Boston & Montana Company of Montana sued the Montana Ore Purchasing Company for $600,000, for ore alleged to have been taken from the plaintiff's ground on the Rarus lead. Now the Montana Ore Purchasing Company have entered suit against the Boston & Montana Company for damages in the sum of $2,200,000, the net value of ores alleged to have been worth $3,000,000 and unlawfully extracted from the plaintiff's property in another part of the same Rarus lead.

THE California State Mining Bureau has issued its bulletin No. 11, on "Oil and Gas Yielding Formations of Los Angeles, Ventura and Santa Barbara Counties," by W. L. Watts. The importance of this new industry in the counties named justifies the careful and exhaustive work done by Mr. Watts for the State. It is valuable, especially to those engaged in the search for the product. The field covered is very extensive and it has taken a long time to prepare the data. The bulletin should have been published some months ago, but owing to the unusual amount of work in the State printing office it has been delayed. At present Mr. Watts and several assistants are at work in San Luis Obispo county, and another bulletin will be issued during the year. All the oil fields of the State, and those districts in which there is a probability that oil may be found, will be covered if the present intention of the bureau is carried out. In addition to the geological work, there is much data of value in this first bulletin as to the refining of the crude oils of the State, which require methods different from those in vogue in the Eastern States and in Russia.

IN an article on the minerals of Montana, G. C. Swallow calls attention to what he describes as a copper placer in a small stream between Jefferson City and Beaver Station, on the old stage road. He says: "My attention was attracted to it by seeing my horses' shoes covered with bright copper after driving through it. I found the water strongly impregnated with a solution of copper and the sand in the bed of the brook filled with bright crystals of the same material."

THE Montana Legislature has passed an act which provides that when any mine is worked by means of a vertical shaft more than 300 feet deep only iron-bonneted safety cages, enclosed by an iron, steel or wire casing, can be used; that the doors shall be 5 feet high and shall be adjusted either on hinges or rollers. The bill further provides that the safety dogs shall be inspected and kept in proper order, and that any one failing to comply with the law shall be fined from $100 to $500. Then, Montana has a mining inspector and can afford such laws.

CAPTAIN WILLIAM HALL, superintendent of the Le Roi mine at Rossland, British Columbia, has had a number of mill tests of ore from his mine made with results of importance to the district, in that they showed that the gold in the ores of the mines about Rossland is almost wholly free. He has, in consequence, recommended that his company erect a mill of about 80 stamps. The saving in the cost of shipping alone would enable the working of much ore that is now of too low grade to be handled, and would largely increase the value of most of the properties in the district.

THE books of the Florence and Cripple Creek Railroad Company and the Midland Terminal Railroad Company show that the tonnage output for the Cripple Creek district for the month of February amounted to 18,200 tons, or 650 tons of ore per day. These figures do not include the ore treated at the Hartzell, Brodie, Globe, Gold and Gold Geyser mills, which would bring the total up to 725 tons per day. Of this amount 7500 tons were sent to the smelters and the balance to the different cyanide and chlorination works. The total tonnage output for March has not been figured up, but it is known that a decided increase has been made in the output over the preceding month.

IN Rhodesia, South Africa, work has not been recommenced in the mines since the war, in which the machinery and plants were for the most part destroyed, and most of the work that was done must be done over again. It is not any fear of a fresh outbreak that hinders mining, but the difficulty of transport. The war destroyed the machinery and plants and the rinderpest destroyed the cattle, and, of course, the transport. It is generally considered by the Rhodesian mining companies that it would be better only to do tentative work until the railway is completed from Buluwayo, which it will be by the end of the year, when stores, plants, etc., can be brought in at much smaller cost.

THE cost of shipment of supplies to South Africa is probably as great as ever they were in the most inaccessible districts of the western part of the United States, and the exorbitant charges on the African railways, due to the rapacity of the Boers, have much to do with retarding the industry of mining there. An illustration is given by the London *Mining Journal* of the cost of seventeen shipments of mining machinery from England. The cost in London was £11,140, and the ocean and railway freights, landing charges and customs brought the total cost at Johannesburg up to £28,606. Of this the railway charges amounted to no less than £11,493. The distance hauled over the railway is only 667 miles. On the last fifty-two miles, over the Boer railway, the charge is at the rate of 41 cents per 100 pounds.

THE output of the mines of the Rand in South Africa for February was 211,000 ounces. With the exception of September, 1896, this is the largest output recorded. The yield since June of last year each month has been monthly over 200,000 ounces and never before that excepting in one month reached that amount. While this would seem to show a healthy increase looking at the totals, a glance at the product of the individual mines will in some respects tell a different story. The claim that the mines would pay in depth as well as nearer the surface is not to be entirely borne out. That the total yield has kept up is due largely to the fact that new mines have been opened. No less than a dozen mines which produced no yield in September of last year have in February yielded some 25,000 ounces. At the same time seventeen of the smaller mines which in September, 1896, produced 37,608 ounces yielded in February nothing. This is a large number in a total of sixty-eight to be closed down in the short space of six months. Yet it must be remembered that there can be no question of the presence of proved ore deposits that while not of high grade are of such extent and size that with economical management and worked on a large scale will profitably produce a great deal of gold for many years to come. That the Rand will continue for many years to be one of the world's great sources of gold cannot be questioned, but whether the annual output will be greater or somewhat less in the near future has not been determined.

THE Exploration Company of London, at the head of which is Hamilton Smith, who first made his reputation as an engineer in California, and which is backed by the Rothschilds, is not in itself a heavy investor in mines, as is popularly supposed. The company was formed about fifteen years ago for the purpose of examining and managing mines for others—syndicates or capitalists who desired the services of engineers. Since then hundreds of millions' worth of properties have been examined, opened, operated and, on their recommendation, placed on the London market. These include the Kimberley diamond mines, many of the largest properties in Africa, mines in Australia, Spain, Russia, and in fact in all parts of the world. Many of these properties are still managed by the Exploration Company for the owners, such as the Treadwell mines of Alaska, the Anaconda properties in Montana, the Tomboy in Colorado, the Helena & Frisco in Idaho, the Oneida in Amador county, Cal., and many of the largest mines of the Rand in South Africa. Lately, upon their reports, electric railroads in Paris and underground roads in London have been exploited by English capital. Some six months ago two similar concerns under practically the same management, the Transvaal and General Association and the Western Australia and General Association, were amalgamated with the Exploration Company, and at the annual meeting in London of the new Exploration Company last month it was announced that the profits for six months were £124,945, and a dividend of £110,000, or about 20 per cent, was declared.

Practical Notes on Hydraulic Mining.*

NUMBER I.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE H. EVANS, C.E., M.E., General Manager Cons. G. Mines of Cal., Ld., Oroville, Cal.

Of the various kinds of mining there are none more interesting than hydraulic mining, and in connection with it there are innumerable points on which a mine manager or superintendent should be thoroughly posted, some of the most important being as follows :

First—Water facilities and the different methods of both roughly and accurately measuring the average amount of water available the season through for working the claim or claims.

Second—The nature of country through which the ditches, flumes and pipe lines have to be constructed in order to carry water for mining purposes, and the different grades suitable for such purpose. This is most important. The writer knows instances where ditches have been constructed for long distances with too heavy a grade, and consequently the water when turned in acquired too much velocity and completely washed away the greater portion of the ditch. On the other hand, by the employment of cheap or incompetent men, ditches have been constructed with too little grade, and there are cases where men have constructed ditches with the fall in the wrong direction.

Third—The quantity of water different size pipes will carry or that can be discharged through pipes and nozzles under various heads.

Fourth—The friction caused by using pipes of too small diameter, and the loss of head due to this; also loss of head due to bends of short radius, and angles of all kinds in pipe lines.

Fifth—A full and complete practical knowledge of the different motors used in connection with hydraulic mining, and all particulars relative to the efficiency of the various kinds of water wheels, etc.

Sixth—The strength of materials, and especially of chains, hemp and wire rope.

Seventh—The bursting and working strain of iron and steel pipes of different diameters, and the strength of iron and steel plates, single and double-riveted, with punched and drilled holes.

Eighth—Methods of economically treating alluvial deposits in large quantities, when there is not sufficient grade for ground sluices, and yet enough water for piping, or in cases where, owing to the debris law, it is necessary to impound the tailings.

Water Facilities.—This is one of the most important matters in connection with hydraulic mining, and great care should be taken in arriving at the average quantity of water available all the year round, or during the entire season, so that sluicing operations can be carried on continuously. In order to do this it is necessary to correctly measure the creeks, or streams, at different points, to fairly approximate the average supply of water that can safely be relied upon from such source, not forgetting that, according to the location, allowance must be made for loss due to evaporation and leakage, which in some cases reaches as high as 20 per cent.

A very simple method of measuring the quantity of water flowing in a stream is as follows: Measure the depth of water in feet, at from six to twelve points across the stream at equal distances; do this in two or three places along a fairly straight course; add all depths together, and divide the result by the number of measurements taken; this will give the average depth of the stream, and such depth multiplied by the average width in feet will give its cross section, or area in square feet, which, multiplied by the velocity of water in feet per minute, will give the number of cubic feet flowing per minute in the stream.

To find the velocity, a very simple way is to step or measure off 120 feet along the bank, and in order to allow for the surface of the water flowing faster than the bottom or sides, and thus obtain the mean velocity, call the measurement 100 feet, and at the commencement of this 100 feet throw into the middle of the stream several pieces of paper or wood at intervals, and note the time it takes each one of them to reach the end of the measured line; then divide the total time in minutes taken by all the floats by the number of floats, and the result will be the average time taken for each float to make the trip; divide the average time in minutes by the distance in feet, viz., 100, and the result will be the velocity in feet per minute, and this multiplied by the area in square feet will give the number of cubic feet flowing per minute; or, if the answer be required in miners' inches, multiply the cubic feet per minute by 2 and divide by 3.

Another simple method for small streams is to put a small dam across the stream and back up the water sufficiently deep to prevent any considerable velocity, and on top of the dam place a thin board with a notch cut out of it wide enough, by estimation, to carry the whole of the water with a moderate depth of overflow, and the following calculation will give the number of gallons discharged per minute, and this result divided by 11.25 will convert the gallons per minute to miners' inches. For example: A weir with 4 inches overflowing the length of a notch which is 6 feet, or 72 inches, wide, the number of gallons per minute would be found by the following formula:

$$G = d \times \sqrt{d} \times 1 \times 2.67.$$

Where G represents gallons per minute, d = depth of overflow in inches and 1 = length of notch in inches. In this case G will be found by multiplying 4 by the square root of 4, and by the length of notch or 72 inches, and then by 2 67, making the quantity of water in gallons per minute = 1538, and this divided by 11.25 = 136.71 miners' inches.

There are many other and more correct methods of measuring the flow of water in channels and streams, but I have illustrated the two most simple, in order that any person of ordinary intelligence could easily determine the quantity of water running in open streams without the aid of difficult formulæ.

Nature of Country for Grades, etc.—The nature of the country through which it is intended to carry ditches or flumes must be carefully considered in order to establish the correct grade, upon which, of course, depends the velocity, or, more plainly speaking, the destroying force of the water, and in locating the sites for water races the following points should be carefully considered:

First—Ascertain by careful aneroid readings the lowest point in the stream, creek or other source of water supply that will allow sufficient grade for conveying the water to a point suitable for working the claim or claims, and if the maximum supply obtainable is less than required for advantageous working, then favorable sites must be located for the construction of storage dams or reservoirs capable of storing sufficient to keep up the required supply.

Second—Should the lowest point in the stream, creek or other source of water supply contain more than enough to meet the requirements of the mine or mines, in driest season, then the locator should select the greatest elevation that the country through which the ditch has to be constructed, and the water supply available at driest season will allow, so that the ditch when completed will command the largest area of mining ground with the maximum head or pressure. This is an important point, as in many instances ditches of considerable length have been constructed and much money wasted in the endeavor to command large tracts of mining ground, and when such ditches have been completed it was found that they tapped the source of supply at such an elevation that it was impossible, except in the wet season to get sufficient water to wash with.

Third—All timber work along the line of ditch should be curtailed as much as possible, and when fluming cannot be avoided the use of iron or steel should be carefully considered for ditches of a permanent nature, as in many instances the first cost is not very much greater, but the durability and the great saving in cost of maintaining more than compensates the owner of the ditch.

When timber work is found necessary, care should be taken in securing the most durable kinds, and after flumes and supports are finished they should be thoroughly coated with a hot mixture of asphaltum, or painted with a good mineral paint, while all foundations for trestles, etc., should be placed in such a manner that they can be easily removed and renewed at all times.

Fourth—The line of the ditch should be carefully laid out so that it will be as short as possible, with, of course, due regard to economy etc., and in coming around long points or in places where sidelings are very steep and composed of loose rock, tunneling through such spurs should be carefully considered, or when it is proved by boring that such tunnels can be constructed to stand without timbering, they should always be preferred to long ditches around such spurs or points, unless the ground for ditching is exceedingly good and the extra distance quite short.

Fifth—Along the line of ditch all springs or water courses should be connected by means of short flumes or ditches, so that the loss due to leaks and evaporation from the main supply will be entirely or partly made up. It is also absolutely necessary for the safety of the ditch that by-washes or water gates be constructed for the purpose of taking care of any sudden increase of water from heavy rains or melting snow along the line of ditch.

These by-washes must be kept in condition to at all times divert any water above the usual height over the gates or through the openings in the sides of the race, and in locating the points for by-washes, or safety outlets, it is necessary to carefully consider what becomes of the surplus water, as in many cases owners of ditches have rendered themselves liable for heavy damages.

Sixth—At the different points along the line of race when fluming has to be resorted to, allowance should be made for an increase of grade, in order that the flume can be constructed of much smaller dimensions than the ditch and yet carry all the water required.

While on this subject, it is necessary to remember that the least amount of friction in ditches and flumes is developed when the least wetted border, or perimeter, is obtained, and to do this the width of the bottom must be from $1\frac{3}{4}$ to $2\frac{1}{4}$ times the depth of the sides. These two points, if carefully studied, will save ditch owners large sums of money in both lumber and construction accounts.

The following is a simple rule for finding the height of the sides of a ditch or flume when area of same is known, and it is desirable to follow the rule just mentioned above:

When width is to be $2\frac{1}{4}$ times the height of the sides, multiply the area in square inches by 4 and divide the result by 9, then take the square root of the product and that will be the height of the sides.

When the width is to be $1\frac{3}{4}$ times the height of the sides, multiply the area in square inches by 4 and divide by 7, then extract the square root of the product and the answer will be the height of the sides.

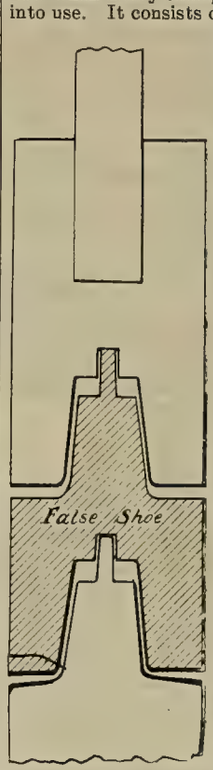
Seventh—It is agreed by the best authorities that, when constructing tunnels, where they will stand without timbers, the best form of roof is the Gothic arch, as it stands better than the circular or any other kind of roof and is not so liable to flake. In fact, tunnels constructed with circular roof, except in very tight ground, have been noticed to flake off until they assume nearly the section of the Gothic arch.

(To be Continued.)

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A New Quartz Stamp.

Richard A. Parker, consulting engineer of the California Exploration Company, has called the attention of the MINING AND SCIENTIFIC PRESS to an improvement in stamps that should be of interest to owners of quartz mills in California, particularly now when heavy stamps are coming more and more into use. It consists of a false shoe to be inserted in the boss as the crushing shoe wears down, and is illustrated by the accompanying cut.



This false shoe was invented for the purpose of keeping the stamp to practically its normal weight as the crushing shoe is worn down. It is made as is the ordinary shoe, with a recess in its bottom the same as the recess in the boss. This, if inserted as the shoe wears down, will maintain the uniformity of the weight of the stamp and consequently maintain the uniformity of crushing, besides allowing an additional amount of wear from the worn shoe. This, however, introduces another feature and demands that the mortar boxes shall be made high enough to permit the insertion of the false shoes, and provision must be made for this accordingly.

Mr. Parker, while in South Africa in charge of some of the large properties of the Consolidated Gold Fields, Limited, made practical tests of these false shoes in mills erected there, and, he states, with very satisfactory results. Speaking of this, he says:

"Stamp milling on the Rand must be regarded in a different light from that of other places or other countries; there it is essentially a crushing machine and its usefulness is dependent upon its ability to pulverize the ore fine enough to liberate the gold and prepare the ore for chemical treatment. Elsewhere the primary object is to amalgamate the ore in the mortar; but the two objects are in a measure opposed to each other. The usual weight of the stamp is 950 to 1050 pounds, and as high as five and a quarter tons per day of blue ore is crushed by the latter weight stamp. To increase the weight of the stamp necessitates an increased area of wearing parts. A 9-inch die used with a 1050-pound stamp has $63\frac{3}{10}$ square inches area of wearing surface. If the weight of the stamp is increased this wearing area should be increased, and the proportionate area for a 1250-pound stamp is 84 square inches, which corresponds to $10\frac{3}{8}$ inches in diameter for the die.

"One thing that is notable in South Africa is the fact that the shoes are made much deeper there than here, in order that a smaller proportion of metal may be thrown away when the shoe is worn out. The advantage of using a false shoe, therefore, becomes much more important in cases where deep shoes are used. All over California there has been an increase of late in the depth of shoes. Mill men are beginning to realize the fact that stamps should be heavier than those used ten years ago.

"So far as my knowledge goes, the ultimate end of all our milling work is going to be confined very largely to the question of crushing. It certainly was so in South Africa, and I see no critical difference between what would constitute good practice there and here. Stamps weighing on an average 800 pounds in South Africa have been replaced by

those weighing 1000 pounds, and in many cases up to 1250 pounds.

"Of course, the question of crushing is a function of the mortar and stamp and shoe and die; and in the mortar of late years the tendency has been to reduce its size so as to keep the pulp upon the dies. In Colorado there are extreme cases where it has been found necessary to amalgamate as far as possible in the mortars, and, as has been shown by Mr. Rickard, there are in use 600-pound stamps which drop 16 inches thirty times a minute. The crushing capacity of such a plant is necessarily limited; and as you pass through the various stages of heavier stamps with an increasing number of drops per minute you finally reach the present modern practice of 1250-pound stamps dropping 8½ inches from ninety-two to ninety-five times per minute. With ample plate surface—which is of the utmost importance—the question of amalgamation in the mortars does not become so essential in the majority of ores found in California mines. The greater the crushing capacity, of course, the less the cost."

The Marble Belt.

Written for the MINING AND SCIENTIFIC PRESS by A. THURSTON HEYDON.

There are many lenses or segregated bodies of limestone in the Calaveras formation upon the west slope of the Sierra Nevadas. These lenses run all the way from an exceedingly impure limestone to as fine a quality of marble as there is to be found in the State. What is locally known in Amador and El Dorado counties as the marble belt is a series of lenses of crystalline limestone extending from above Fairplay, upon the middle fork of the Cosumnes river in El Dorado county, to Volcano in Amador county. These lenses are exposed to view at the middle fork of the Cosumnes, at the old mining town of Brownsville (otherwise known as Mendon), at Indian Diggings, at Dry Creek and at Volcano. Much of this marble is of such a fine quality that lack of transportation is all that prevents it from being commercially valuable. At Volcano and Indian Diggings attempts were made to quarry it, but the cost of transportation made them failures.

Although the marble as marble was an unavailable source of wealth, and in itself contained no gold, still the marble belt has been and is of great interest to gravel miners. This is because in and around the various lenses were and are large deposits of exceedingly rich gravel. These gravels were so rich that from 15 to 20 feet square constituted a claim, and from these small areas gold was taken out by the tens of thousands of dollars. On account of their manner of formation these deposits have never been exhausted, although Volcano has been worked continuously ever since the early '50s.

The Formation of the Gravel Deposits.—Water has a solvent power upon lime. The great caverns in limestone were formed by the waters dissolving and carrying away the lime atom by atom. For this reason the waters gradually cut large irregular basins in the marble wherever opportunity offered, and filled them with gold-bearing gravels. The process of cutting out and filling in proceeded simultaneously and extended over a great space of time, as the waters gradually dissolved the marble underneath, allowing the gravel to sink and giving room for the deposition of fresh gravel on top. The slowness of the process allowed a greater concentration of the precious metals and accounts in part for the great richness of the gravels in the marble belt.

After the underlying gravels were deposited came the various rhyolitic or aqueous lava flows which partially filled the then existing channels. As the gulches were not quite filled the streams cut secondary channels, known as cement channels, in the soft rhyolites or chalk lavas, and filled them with gold-bearing gravels of varying value. Subsequent fragmental lava flows and showers of volcanic ash filled the gulches, covered the country and necessitated the cutting of a new drainage system.

With the exception of the middle fork, the places mentioned were formed in the days gone by, but there the process of formation is still going on in the bed of the river.

The Character of the Gravel.—The gravel is to quite a large extent a fine quality of quartz, often sprinkled with gold, mixed with blue gravel and iron, which occurs both as a limonite and a magnetite. The iron is often found in masses of several hundred weight. In addition to these are the various petrifications and reformations characteristic of the marble belt. These, especially the chalcedonies, are often very beautiful, and if within reach of a market would be valuable for mosaic and other ornamental stone work. The gravel is slightly cemented, just enough to hold the gold, and it falls apart as soon as touched by running water.

The Past Work.—In order to fully appreciate these peculiar deposits and comprehend the amount of work which has been done in the various camps upon this belt, it is necessary to visit them in person and spend months in unraveling their peculiarities. Such time is not wasted, for they, as well as their inhabitants, are very interesting studies. As long as the deposits were easily accessible the various diggings were redhot mining camps. Everybody had money and was anxious to spend it. The majority succeeded.

When the camps became hydraulic propositions they were no longer run at such a high pressure, although they were still prosperous, and continued so until the unjust anti-debris law put an end to further operations. Since then, outside of Volcano, but little has been done, with the exception of the gophering done by a few '49 spring of '50s.

None of the various camps have been worked out. The middle fork requires more machinery and better directed effort than has yet been expended upon it, which is to quite an extent true of all the other places. Hydraulic elevators and ejectors are the solution of the problem of working the deep ground. At Brownsville, outside of a few points of marble, no bedrock has yet been struck. Although unquestionably rich, this deposit is an exceedingly difficult one to work successfully without a consolidation of several properties and a large working capital.

Indian Diggings was a wide-open mining camp in the early days, and polled 600 votes in '56. Its largest deposit of gravel, which is over 150 feet in thickness and prospects evenly and well throughout its whole thickness, is owned by the Plymouth Consolidated Company, and is lying idle because of the fear that after the required $75,000 is expended in opening it up the anti-debris forces might succeed in closing it down. Outside of this, there are a number of other properties which, if reopened and properly equipped, would yield rich returns upon the investment, for there is as good gravel remaining as was worked; besides, but little bedrock has been cleaned, but that which was immensely rich. There is no better recommendation for the remaining gravel than the fact that Indian Diggings was one of the two most famous places upon the marble belt.

At Dry Creek the conditions were not as favorable for the formation of the rich gravel deposits which made Volcano and Indian Diggings so noted.

With its surrounding gulches, whose yield was simply phenomenal, its Hell's Half Acre, and enormously rich gravel deposits in its marble basins, Volcano was the most noted of all the camps upon the marble belt. When the easily accessible deposits were worked out an expensive tunnel and tailrace were blasted out of the solid rock for an outlet. Although there is a great deal of gold remaining here still, this section does not offer the same inducements and openings for enterprise and capital as the more northern portion of the marble belt.

New Mexican Miners' Association.

The following letter referring to an item quoted from a New Mexican paper in the MINING AND SCIENTIFIC PRESS of March 20th is self-explanatory:

We note in your issue of the 20th inst. mention of the organization here on the 18th inst. of the New Mexico Miners' Association, which adopted the by-laws and constitution of the California Miners' Association. F. A. Reynolds of Chloride, N. M.; Antonio Joseph of Taos, N. M., and James H. Purdy of Santa Fe, N. M., being elected president, vice-president and treasurer, respectively. That mention adds erroneously: "It was stated that the object is to unite mine owners and capitalists interested in New Mexico against the Western Federation of Miners, which has so long flourished at Leadville, Cripple Creek and other camps in Colorado."

Will you, by publishing this denial, please correct the error so made. It is not true that any such statement was made at that organization by any one or in any manner as to the objects of our association, or otherwise. The Western Federation of Miners was not mentioned or referred to. The New Mexico Miners' Association is organized for the following purposes, which are set out in the articles of incorporation as article II thereof, as follows:

Article II—Objects. "The objects for which this association is formed are: To develop, foster and protect the mining industry of the Territory of New Mexico, and to those ends to obtain all desirable information of the location, extent and character of the mineral resources of this Territory, and to make that information widely known at home and abroad; also, to obtain all attainable scientific and reliable desirable information, especially the latest, pertaining to mines and mining, and to the means and methods most approved for their development, and similar information of the methods of treatment of the mineral-bearing ores, and to diffuse as widely as practicable the information so obtained; also, to promote intercourse between those friendly to the mining interests in New Mexico by meetings and otherwise."

F. A. REYNOLDS, Pres. N. M. M. A.
JAMES H. PURDY, Sec.
Santa Fe, N. M., March 30, 1897.

British Columbia Minister of Mines' Report.

The annual report of the Minister of Mines of British Columbia for the year ending December 31, 1896, has been received. This promptness in publishing reports so that they may be of practical value might well be universally initiated. All the work done seems to have been timely and of a nature to be of most value to the industry. The total production of minerals for all years up to the end of 1896 is given in the following table:

Gold, placer	$ 57,704,855
Gold, lode	2,177,869
Silver	1,028,224
Lead	1,606,427
Copper	254,802
Coal and Coke	33,934,427
Building Stone, Bricks, etc.	1,300,000
Other Metals	25,000
Total	$100,931,604

The following table gives a detailed statement of the amount and value of the different mine products for 1895 and 1896, but it has as yet been impossible to collect statistics concerning the amount of building stone, brick, lime, fire-clay, tiles, etc. The increase in the value of the precious metals produced, and the baser metals, especially of lead, is marked, and the total increase for 1896 over 1895 was from $2,834,000 to $4,816,000.

PRODUCT.	1895. Quantity	1895. Value.	1896. Quantity	1896. Value.
Gold, placer, ozs	24,084	$ 481,683	27,201	$ 544,026
Gold, quartz, ozs	39,264	785,271	62,259	1,244,180
Silver, ozs	1,496,522	977,229	3,135,343	2,100,680
Copper, lbs	952,840	47,642	3,818,556	190,926
Lead, lbs	16,475,464	532,255	24,199,977	721,384
Coal, tons	939,654	2,818,962	846,235	2,327,145
Coke, tons	432	2,269	615	3,075
Other materials		10,000		15,000
Totals		$5,655,302		$7,146,425

PRODUCTION OF METALS PER DISTRICT.

DISTRICT.	1895.	1896.
Cariboo	$ 282,400	$ 384,050
Cassiar	22,575	21,000
Kootenay, East	17,575	154,427
Kootenay, West	2,223,206	4,002,735
Lillooet	40,663	33,665
Yale	241,581	206,078
Other districts	10,000	15,000
Totals	$2,838,000	$4,816,955

The gold output is now beginning to steadily rise as the operations of the large hydraulic mining companies in Cariboo begin to assume such a scale, that with larger water supplies and the mines more opened out for work, a much larger amount of ground can be washed.

The next table shows very clearly the fact that lode mining in this Province has just fairly begun, and that the progress now being made is decided and very satisfactory.

The gold production of course consists mostly of the output of Rossland mines as per smelter returns, but there are added the gold saved by amalgamation in the Oeoyoos district as at Camp McKinney, in the Nelson district as at the Poorman mine, and the product of small lots of gold ore sent out to the the smelters from other parts.

Some silver ore is known to have been sold prior to 1887, but no record has been obtained regarding these small sales.

PRODUCTION OF LODE MINES IN BRITISH COLUMBIA.

YEAR	GOLD. Ounces.	GOLD. Value.	SILVER. Ounces.	SILVER. Value.	LEAD. Pounds.	LEAD. Value.	COPPER. Pounds.	COPPER. Value.	Total Values.
1887			17,690	$ 17,331					$ 17,331
1888			79,780	75,000					75,000
1889			53,192	47,873					47,873
1890			70,427	73,948	113,000	5,805			79,753
1891			4,500	4,000	588,665	25,607			29,607
1892			77,160	66,935	1,768,420	72,505			139,440
1893	1,170	23,404	227,000	195,000	2,135,023	78,996			297,400
1894	6,252	125,014	746,379	470,219	5,662,523	169,875	324,680	16,234	781,342
1895	39,264	785,271	1,496,522	977,229	16,475,464	532,255	952,840	47,642	2,342,397
1896	62,259	1,244,180	3,135,343	2,100,689	24,199,977	721,384	3,818,556	190,926	4,275,179
Totals	108,945	$2,177,869	5,907,993	$4,028,224	50,943,072	$1,606,427	5,096,076	$254,802	$8,067,322

Reports in detail are made upon the different districts by capable assistants. These have been noted and quoted from in the MINING AND SCIENTIFIC PRESS as they appeared during the latter part of last year.

The Bureau of Mines was organized January 1, 1896, and will have its offices, laboratories and library in the new Government buildings when they are completed. In addition to the work of examining and reporting upon the mines of the Province and maintaining a laboratory for determining minerals, it is proposed to maintain student laboratories for instruction in assaying, blowpiping, mineralogy, geology, etc., and to establish and equip a plant for testing, metallurgically, the different kinds of ore, coal, coke, etc.

Mining Summary.

CALIFORNIA.

Amador.

Ledger: Mr. Dillon, the superintendent of the Robinson mine, has determined to put up roller mills to ultimately extend to the capacity of 100 stamps.

At the Baliol mine the 40-stamp mill is crushing night and day up to its fullest capacity. New tunnels are being opened up, but the entire force of men on the payroll numbers only thirty-eight. Half a dozen men or even less keep the ore bins constantly filled and the 40-stamp mill crushing day and night.

At the McMahon mine as soon as the machinery can be put in the shaft is to be sunk until it taps the ledge at a supposed increased depth of about 130 or 140 feet. If this work results in showing a satisfactory character of ledge matter, the intention is to sink another and larger shaft to the eastward to tap the ledge at a greater depth.

Dispatch: In the Jackson Gate they are crosscutting to strike the east ledge; but as the rock is very hard they are making rather slow progress.

On the Good Hope stations are being opened and levels have been started at a depth of 115 feet. There is a 10 stamp mill at this mine which has been started up north and south along the ledge and good ore is being taken out.

Republican: At the Alma the east drift at the 1000-foot level has penetrated ledge matter a distance of 30 feet. The quartz prospects free gold by ordinary miner's pan test. The ore is considerably broken up, and while the distance between walls shows the existence of a true fissure vein, it may be that drifting north and south will be necessary to encounter the well-defined ore body.

At the Oneida the shaft is down 820 feet, and sinking will be continued until a depth of 1500 has been reached. The new hoist has been put into service and the old hoist removed.

Butte.

Mercury: The machinery in the Carlisle mine will be started up this week. Ten men will be employed to begin with.

The Jersey Blue mine, on Ohio flat, shows a ledge of 5 feet, with excellent ore in sight.

Calaveras.

Mountain Echo: The Rosehill gravel claim, in El Dorado mining district, formerly owned by the Rodoscino heirs, has been sold. Surveyors have surveyed the ground, and preparations are now being made to hydraulic the gravel. The new management will lay 10,000 feet of pipe and begin operations at once with a large force of men.

The Martin mine has been purchased by G. W. McNear of San Francisco. The claim is now being worked by water power, but heretofore it was operated by steam. Mr. McNear worked this mine in the month of January with a force of fifteen men, but has since increased the working force.

A San Jose company, through the agency of Mr. E. W. Hayden, has purchased the Gaston hill drift mine, in El Dorado mining district for $12,000. The company will commence work about the 1st of April.

The Ponte talc mine in San Domingo district has been bonded to a Los Angeles company whose expert was up the other day to inspect the property. A tunnel is being run to tap the vein at a depth of 100 feet.

Prospect: A rich strike has been made in the Blood mine at Collierville during the past week. An opening 6 feet wide, with a vein on one side varying from 8 to 12 inches has been encountered and the rock is of high grade. Prospecting work is being done at the Zigler mine, on the hill between the Gold Cliff and Utica mines, with results very encouraging to the owners. A tunnel 180 feet in length has been run along the vein, showing an immense body of ore, the exact width of which is not yet known, but it is believed that it will average from 25 to 40 feet.

Mr. Higgins, manager for the company who are developing the Ponte mine across the San Domingo, has completed his tunnel which taps the lode at about 75 feet. The rock found is filled with sulphurets and is of a low grade.

Citizen: William Drown has organized a company at San Francisco to develop his mine at Angels Camp.

The Nap mine, west of North Branch is being prospected by A. C. Van Meter.

At the Gwin mine work is going steadily on at the 1300 and 1400-foot levels. The face of the north drift is 238 feet from the shaft, and the face of the south drift is 250 feet away. They are taking out some fine quartz, and the mill is crushing about 110 tons a day. During March 3500 tons of rock were put through the mill.

An 8-foot gold-bearing ledge has been discovered at the Bald Hill mine about 200 feet from the old shaft.

El Dorado.

(Special Correspondence).—The drift on the 350 level of the Septimus Development Company's mine has reached 500 feet. It is expected that 50 feet additional will reach the Robinson chute, which five years ago produced good ore.

The tunnel through the Mierson Consolidated property, by which it is calculated to tap the Lloyd ledge at 450 feet, has been driven 175 feet. The work on this property is doue by power drills and is moving rapidly.

The north drift on the Empress Josephine is 35 feet in a good body of ore.

The Salisbury mine, a corporation in which A. W. Longley of Chicago was the largest shareholder, because of default in paying the April installment, has reverted to D. H. Jackson.

In the Darrow mine the tunnel to the lead is 240 feet. The drift on the lead is 700 feet. Crosscutting has been started. Thus far the ledge is found to be 40 feet. The ore is low grade. The footwall is said to be talc and the hanging a species of schist.

The Point Lookout mine has a tunnel 100 feet on the ledge, from the center of which a shaft has reached 20 feet on ledge matter. The walls have not yet been found. The whole hill, from the grass roots, seems a milling proposition, and the ore averages $10 in free gold, with 5 per cent sulphurets that run from $50 to $150 per ton. The formation is locally known as quartzite. The property has a 4-stamp mill in operation, to which the ore is carted one-half mile.

The several properties owned by I. C. Heald at Nashville are receiving the attention of Eastern people. They are all mother lode veins, said to lie in the center of the belt.

Considerable prospecting is being done in the old Kanaka district in the vicinity of the confluence of Weber creek and the south fork of the American river.

The demand for gravel properties in this mother county of rich placer diggings is growing steadily and a few of large dimensions are about to change hands. Some of these are milling and others of a hydraulic nature. The hydraulic elevator will also come into use.

The tunnel on the Boulder mine last week had reached 548 feet. It is thought that at 30 feet farther the ledge will be tapped. This is said to be a fissure vein in the contact. A 10-stamp mill is completed on the property.

The depth attained in the Big Canyon mine is 900 feet, but water impedes work at that point. Ore is being milled at present from the 300 level.

A custom mill is among the recent achievements of an enterprising citizen of this place. The machinery will be in operation within a few days.

There is a superabundance of idle laborers hereabouts. Mining men coming here for work will be disappointed, and the outlook for employment is not growing to any encouraging extent for those already here.

Placerville, April 5th, '97.

Kern.

Los Angeles *Times*: At Randsburg some rich strikes have been made recently. A. Matheson in the Marvel mine, beyond the Stringer district, struck a pocket of ore on Friday last.

In the Reedly mine, Jenkins, owner, some rich ore has been found. This mine lies northwest towards the valley.

The Minnehaha, one and a half miles southwest, owned by Maginnis, Hanson and O'Leary, is showing up well. They are sinking a double compartment shaft and have a vein of ore running from 2 to 4 feet.

The owners of the G. B., on the Kramer road, have milled ninety tons recently which went $20 per ton. The vein of ore runs from 2 to 4½ feet and is easily worked.

Los Angeles.

For many years the part of Lytle creek between Santa Barbara and the mountain source has been successfully worked for gold. The recent find of a $50 nugget gave a renewed zest to the work, but the prospectors had not given the quartz along the creek much attention until a firm of Los Angeles capitalists commenced last October to drive a tunnel into the hillside. It is now in 100 feet and the workmen are in a ledge of gold-bearing quartz that assays very high.

Mariposa.

Capt. H. H. Todd, who bonded the Quartz Mountain properties near the junction of the North Fork and Merced mines in Mariposa last October is, with Capt. A. H. Ward, about to begin their development, and buildings are being erected. There are immense deposits of low-grade ore in cases 100 feet wide, over 2000 feet in length, with strong feeders running in. With the cheap water supply available, and facilities for working through tunnels, the ore can be worked very cheaply.

Arc Light: Sinking has been resumed in the Great Western mine, owned by Frank Baumbogger. The shaft in this mine is being sunk in good ore.

At the Tryon mine the working shaft has reached a depth of 200 feet, and a drift has been run through a solid body of ore more than 26 feet, and the end is not yet. Tests of this ore body have proved satisfactory to the company. Sinking has again been resumed, and will be continued to a depth of perhaps 600 feet.

Gazette: Pinon Blanco mine, owned by Capt. A. H. Ward has been bonded to the Iron Mountain Mine Company of Colorado. The first payment has been made. The company expects by the first of May to have a full force of men at work developing the mine. Surveys are being made for further plants.

The Virginia mine, belonging to D. O. Toole, has been bonded by the California Exploration Company. Their engineer, R. A. Parker, has put a force of men to work sinking a shaft and clearing the old tunnel, and will in a short time consider the erection of a 20 stamp mill it develops well.

Nevada.

Transcript: The prospects in the El Capitan lower tunnel, at Washington, are encouraging. It looks as if there would be as great a shoot of ore as in the Giant King and Queen, both being in the same fissure and contact sister shoots.

The Giant Queen mine, south extension of the Giant King, has been bonded to parties with capital, who propose to open up and develop the property.

Union: The Bullion shaft is now down 830 feet and drifts are being run both ways. The ore is being crushed at the Omaha mill, and that from the No. 2 level is of good milling quality.

Telegraph: In the Omaha there is every prospect of a continuation of pay ore. It is the present intention to sink an incline shaft on the newly purchased ground.

The Brunswick mine has for a long time been contending with a stream of water which is under control by the 10-inch plunger pump in the bottom of the mine.

San Diego.

Union: The Glen Cliff Mining Company resumed work on its mines two weeks ago. A shipment of ore, has been made which justifies an additional force of men.

The Owens mine at Julian is to have its main shaft deepened 200 feet, making the shaft 550 feet in depth.

A new mining enterprise has been started in the Chihuahua district, northeast of Oak Grove and near the dividing line of San Diego and Riverside counties. Several of the claims are owned by Los Angeles men, who have secured mill sites and water rights and are preparing to put up a 10-stamp mill. There is a 90-foot shaft on one claim in the district, and the development work that has been done shows a promising vein of ore. Very good assays are obtained from the surface rock.

Placer.

Colfax *Sentinel*: At the Drummond mine the new lower tunnel is now in about 400 feet. Power drills are used and two shifts of three men each are making about 40 feet per week The tunnel will be run 1200 feet in all. This tunnel will tap the ledge 500 feet below the tunnel.

The Central gravel mine, at Deadwood, recently purchased by J. O. Whitney, has six men engaged on development work. A larger force of men will be put on this spring.

Shasta.

Searchlight: The Safe Deposit mine on Spring creek, owned by Stump, Foster, Fitzpatrick & Lilly, was bonded last week to George Senn, who will at once put on a force of men to push development and if the properties come up to expectations will close the deal by the payment of $30,000 at the expiration of the bond in ninety days.

Dale & Dawson made a shipment of ore from their mine on Little Churn creek to the smelters at Keswick last Tuesday which returned over $56 to the ton. The ledge from which the ore is taken averages about 14 inches in width.

Quite a number of persons in that vicinity are engaged in shipping and delivering "bull quartz" to the Keswick smelters where it is used as flux.

Geo. Vestal and his associates have uncovered a very rich ledge near Horsetown.

President Schmitt and Superintendent Rahn of the National Consolidated have closed a contract for 50 H. P. from the Spring Creek Electric Power Company and will hereafter run their mill, hoists, etc., with electricity.

A road has just been completed from the Garfield, Logan and Mt. Shasta claims one mile away. Rock is now being broken on these properties and hauled to the mill. These upper claims have been developed by means of three tunnels; the lowest cutting the ledge at a depth of about 200 feet and showing 5 to 6 feet of good ore.

The Reid group of mines in Old Diggin's are showing up well under development. The group is composed of six claims, and development at the greatest depth yet reached shows a 10-foot ledge of good quartz.

G. A. Von Krueze, superintendent of the Sybil group of mines, on the Deadwood-French Gulch divide, proposes to put in a 40-ton roller mill.

A great amount of good ore is at present on the dumps and in the bins. Twenty-two men are employed on development work. The lower tunnel is now in about 170 feet, but considerable distance will have to be covered before the objective point is reached.

The Crown Point Consolidated, having completed its new road to the mine, is now hauling ore to Redding for shipment to the Keswick smelter.

A. C. Hamilton, Harry Gorham and W. E. Lester, who with Senator J. H. Jones are interested in the bond on the Milkmaid mine at French gulch, were here from Virginia City the past week looking over their property interests.

Free Press: Dobrowsky and Bergh have let a contract to complete the development of their mining property near Shasta. They recently completed their lower tunnel, which is 185 feet in length and taps the ledge at a depth of 100 feet.

J. P. W. Davis, who owns the Washington mine on Whisky creek, has made a sale of the property for $3000 in three payments.

Siskiyou.

Journal: The Columbia quartz mine, near Scott river, sent a lot of bullion to Yreka last week. Eighteen men are employed getting out quartz to keep the mill running.

W. A. Chamberlain and Dr. A. J. Timmons, who own the extension of this ledge, the Mabel mine, intend to start up work soon for the summer season.

The cold weather lately has frozen up the water supply in the Salmon range, preventing the hydraulic miners of Quartz valley, Oro Fino, Mugginsville, and Scott valley from piping.

At the American Bar mine, Klamath river, they are now hoisting dirt. They employ about forty men and by reason of the machinery being geared up so much higher than the ordinary river derricks, they can handle about 300 tubs of dirt, each carrying from 1000 to 1200 lbs. in twenty-four hours, which is more than twice the amount the old plants can handle. The gravel in this mine pays well all the way down to bedrock.

The Boomer mine, near the Forks of Salmon, owned by Wm. Bennett, is now being worked with good results. Mr. Bennett also has a giant at his mine near his home on the Forks and one at the Crapo mine. The one now working on the Crapo will be removed to another piece of ground about two miles from the Forks of Salmon, containing about forty acres.

Several other hydraulic mines on the Salmon river are in operation, and are reported to be paying well.

There is some talk of again starting up the 20-stamp mill at the Gold Ball mine, near Sawyer's Bar. This property has been idle a long time.

News: The Klamath Flume & Mining Co. (The Big Four Company) are running a higher survey, starting at their tunnel site and carrying the line to the East Fork of Indian creek. They have four gangs of men at work drifting on their property near William Point to determine at what point their ground shall first be opened up. In May work will commence on their 1,000-foot tunnel and on the eleven-mile ditch and flume.

Tuolumne.

Union-Democrat: On the Rawhide the main shaft is being driven down towards the 1100, although sinking will not be discontinued until the 1300 is reached. Crosscutting, drifting and stoping on the 900 and 1000 levels goes on every shift in the 30-foot vein.

On the Rappahannock sinking has passed the 600-foot mark. When the depth amounts to 630 feet, crosscutting and drifting will be commenced on the 600, the extra 30 feet being for a sump. In the bottom of the shaft a 35-foot vein of good rock shows up, with very little water to contend with.

Independent: Sinking continues on the several shafts of the Tarantula steadily and the ore gives promise of a bonanza.

The Andy Johnson mine, at Chinese Camp, will open up again as soon as the engine is in place.

The Rappahannock is still sinking in its main shaft and good ore is being added to the dump.

The Gerrymander mine has unearthed another rich vein of ore.

Good rock was struck last week in the McKennie mine on the Parrot's Ferry road, two miles from Columbia.

Ventura.

Herald: The most authentic information from the Ojal gold fields is that many of the mine owners have consolidated their mining interests, money thus being secured to aid development. Two miles west of Nordhoff considerable low-grade ore has been found. Although a shaft is down only 3 feet, a well defined 2-foot lead has been found. The most flattering reports, however, come from the Big Six mine in Gridley canyon, located about five miles northeast of Nordhoff.

NEVADA.

Elko *Tidings*: Located about sixty miles north from Wells is the rapidly growing mining camp of Salmon. The district was located in 1872 by Hanks, Lewis and Noll, and for a time created great excitement among prospectors, but trouble in milling soon caused the excitement to die out and the camp to sink into oblivion. About two years ago the attention of mining men was again attracted to this district and several tons of gold and copper bearing rock were shipped to the smelters at Salt Lake City. Last year a large smelter was erected by Eastern capitalists and the camp commenced to grow and is still growing. During the winter months the smelter has been lying idle on account of the deep snow in this section and the poor condition of the roads leading to Wells, which prevented transportation. But several of the mines have been kept open all the winter, and when the snow will have disappeared and the roads have again become passable, there will be more than enough rock to run the furnaces for several months. At present there are about 200 men in the camp, living in rock houses and tents.

It is reported that the Magnolia mine at De Lamar, which is showing up finely, will shortly pass into the hands of the De Lamar Company.

Dayton *Times*: Nine tanks for the Davis leaching plant are being set up.

Widening and cleaning the Douglass ditch has been completed and the water turned. The ditch has been widened to 6 feet 6 inches at the bottom, and will carry water enough to furnish power to run the concentrating plant being put in. W. H. Peck has forty men employed at the mill building in Dayton. He expects to start up in less than thirty days, and will work about 300 tons daily. The supply consists of about 450,000 tons, the reduction of which will require at least two and one-half years. Chas. V. Peck will be the superintendent of the new concern.

Walker Lake *Bulletin*: Col. Sutherland spent several days in Candelaria last week. A lot of machinery, a sampling outfit of the Bailey process, is now at Belleville.

OREGON.

Jacksonville *Democratic Times*: Belding & Dowell of Green's creek will soon erect a stamp mill. They have several hundred tons of good ore on the dump.

G. W. Bailey has opened the old Mountain Lion mine on Missouri flat in a new place, and discovered a vein 18 inches wide which prospects well.

Six monitors are running at the Hampton-Lewis mines on Grave creek. A race 1200 feet long has just been completed, which is paved with railroad iron.

The Spokane parties who bonded the Boynton ledge on Jump-off-Joe for $3000 have found that the pay seam widens from its original 18 inches to 4 feet, and some of the rock assays high.

BRITISH COLUMBIA.

From the Slocan the Wonderful is working twenty-five men and the shipments from the mine amount to one-half car a day.

The Payne mine is now shipping sixty tons of ore daily. The Ruth is shipping thirty tons.

The Carbonate mineral claim has now passed wholly into the hands of Charles E. Caldwell of Kaslo, who recently purchased the remaining interests of Gay Reeder and D. E. Croft for $5000.

Galusha and Finch, the chief owners of the Jumbo mine at Rossland, have received a cablegram from the London interests holding the option on that mine asking for an exten-

sion of twenty days. They telegraphed in answer that it could be had for $5000 cash. The present option, which expired April 1st, cost the holders $3500.

Up to Saturday, March 27th, there has been shipped from the Rossland mines 13,940 tons, as follows: Le Roi, 9856 tons; War Eagle, 2447; Columbia & Kootenay, 455; Iron Mask, 707; Jumbo, 91; Josie, 126; Cliff, 61, Red Mountain, 56; O. K., 86; Evening Star, 21; Giant, 21; I. X. L., 12. The shipments from the O. K. were concentrates. During the period from January 14th to March 27th there were 1337 tons of ore milled at the O. K.

The Reco Mining and Milling Company, Limited, who are operating the Reco mine, near Sandon, intend to put up a double-rope aerial tramway and a 120 ton concentrator. In 1894, with six men, ore to the value of $7500 was taken out of this mine; in 1895, with from eight to twenty men, $41,787; last year, with fifty men, $62,073; and up to date this year $124,000. They ship a carload, or twenty tons, every two days, which brings in $4000 net profit. One carload cleared $10,000. The ore is produced from a lead which does not average more than 4 inches of clear ore.

UTAH.

Salt Lake *Tribune*: W. H. Donnell of the Sunbeam and Rabbit's Foot is negotiating with Wilson & McCormick for the purchase of the Geneva mine at Silver City.

The North Star group, consisting of ten claims, lying eighteen miles from Frisco, has been secured by Murray, Weigel & Cory.

Articles of incorporation have been filed of the Boston & Mercur Gold Company, formed by Boston and Salt Lake capitalists.

Bingham *Bulletin*: At the Nast mine the new owners will clean out the Bullion tunnel and probably resume work in the long drain tunnel begun three years ago near the mouth of Muddy gulch. This tunnel, if ever completed, will cover nearly 4000 feet. It will have a depth of about 650 feet below the tunnel level of the Nast.

Vadner & Frisbee have secured a bond and lease on the Argentine, paralleling the Zelnora on the west.

About 360,000 feet of lumber will be required for the Highland Boy mill building.

Tintic *Miner*: Work on the Independent-Tesora property has been suspended and the machinery has been transferred to the Treasure Leasing Company. The machinery is now being erected on the Valley claim, which is being worked by the latter company.

Work on the Eagle mine has been commenced under the direction of N. W. McChrystal.

Shipments for the week were as follows: From the Bullion-Beck mine, twenty carloads of ore; Bullion-Beck mill, ten carloads of concentrates; Humbug, three carloads of ore; North Star, two carloads of ore; Buckeye, one carload of ore; Dragon iron mine, two carloads of ore daily; Noon's iron mine, one carload of ore daily; Mammoth mill, seven carloads of concentrates; Sioux mill, two carloads of concentrates.

Park *Record*: At the Constellation mine the prospects are much better. The entire force of three shifts is drifting on the ledge, which is growing larger continually.

No date for the resumption of work at the Marsac mill has been agreed upon, nor is it likely to be until the return of Superintendent Chambers from San Francisco. The ore in the Marsac bins now is in the neighborhood of 900 tons.

IDAHO.

The Consolidated Tiger-Poorman mill at Burke is now treating a daily average of 230 tons of ore.

At the Frisco the first set of timbers has been placed in the new station on the 500-foot level. Sinking has been resumed in the shaft and it will be put down to the 800-foot point as rapidly as possible. Carpenters will be through with alterations in the mill about April 10, and will then begin on the new ore sorting room. The improvements now under way will cost about $200,000.

The Montana mine on Estes mountain has been sold and the first payment of $10,000 has been made. As soon as spring opens mining machinery men will be given an opportunity of figuring on a plant to treat the ore.

It now looks as though the Seven Devils mining district will be reached from Payette, instead of Weiser, as the former camp has succeeded in giving the largest bonus for the building of the road.

In the bottom of the shaft of the Banner mine—200 feet deep—they have cut into the largest body of ore yet found in this property.

Another strike in the Elkhorn has created considerable excitement. The ore body now exposed is 3 feet wide, of iron oxide quartz and the best grade. This property is three miles west of the Banner, at the head of Slate creek.

The management of the Lucky Boy Company will make some radical changes in its milling plant. The mill was originally erected to treat sulphuret ores. Thirteen hundred tons were run through a gold mill, with the result that 85 per cent of the gold was saved. Another lot was worked by raw pan amalgamaion and 85 per cent of the silver was saved. From these facts it is known that a combination mill with plates and pans will serve that purpose, while twice as much ore can be put through wet as by the process requiring it to be crushed dry. It is expected that the change will be completed about the first of June and the management hopes to produce during the year about $700,000.

MONTANA.

Mining and Railway Review: At Neihart the Diamond R. Mining Company will begin the erection of a 100-ton custom concentrator about May 1st, to be completed within sixty days. This company owns the Moulton and other good property at Neihart, all of which will be worked, and if successful other companies will put up concentrators.

The Galt mine at Neihart last week finished the upraise to the upper workings and is now ready for heavy development as soon as the company sees fit to put on a larger crew.

Inter-Mountain: There are now about 300 men at work in the Alice properties, including the lessees and tributors. The 60-stamp mill of the company is running regularly.

The Montana Mining and Milling Company, Limited (Drum Lummond), has begun work preliminary to building its cyanide plant. A force of men are putting in a switch from the Northern Pacific track below Marysville, which will run to the site of the plant. Over the switch will be hauled all the material for the plant, and in a few weeks actual construction, it is said, will be under way at the dam. The cyanide plant which the company will operate in the future will be one of the largest in this part of the West.

The old Liverpool mine in Lump gulch last summer was closed down for some time by its owners, the Merrill-Miller Mining Company, owing to the boarding-house trouble, which involved all three of the largest mines of the district. Several months later it was leased to Alex Swain of Helena, who reports that he has received returns from a shipment of ore from the 450-foot level of the mine which netted him 187 ounces of silver to the ton.

Thos. Ewing, manager Diamond Hill mine, is pushing the work at the mine as fast as possible. Seventy men are employed.

Manager Kelley, New Elkhorn Mining Co., reports 1175 tons ore raised during December. The result of the month's operations is as follows: Estimated value of bullion shipped, $24,755; surplus on November shipments, $569; net value of bullion, $25,324; returns from ore shipped, $6,324; total receipts, $31,550; current expenses, $25,280; profit for December, $6270.

Butte *Miner*: A lease has been granted by the Anaconda Company on the Grant Extension fraction to Swett & Metcalf, who are sinking a shaft from the surface. They have machinery on the ground to hoist from a depth of 500 feet. At the High Ore No. 1, a body of smelting ore 60 feet wide on the 1200-foot level is furnishing its quota of ore for the smelter. At the High Ore No. 2 the shaft is down 1060 feet with crosscutting in progress on the bottom. At the Modoc all work above the 1000-foot level is suspended for the present. Hoskin & Co. have secured a lease on the west end of this claim; they have machinery on the grounds to put down their shaft as fast as possible. At the Mountain Consolidated both shafts are down to the 1300-foot level; at the No. 2 shaft a streak of ore 15 feet wide was encountered in cutting the station. This is considered a stringer from the vein. At the Never Sweat the shaft is down below the 1400-foot level, with sinking still in progress. The ore on the 1200 and 1300-foot level is from 80 to 100 feet wide. At the St. Lawrence the shaft is down below the 1300-foot level.

Preparations are being made to sink a shaft 1000 feet on one of the syndicate group of mines belonging to the Anaconda Company. This mine is a silver property and but little work has been so far done on it, the shaft being now down about 5 feet.

COLORADO.

(Special Correspondence).—In Cripple Creek district operations have been resumed on the Wisconsin group of claims, between Bull hill and Battle mountain, by E. Hasey, who has outlined some extensive development work.

The litigation between the Smith-Moffat Syndicate, owners of the Granite lode, on Battle mountain, and the Portland Gold Mining Company, whose Portland group of mines adjoin the Granite, is in a fair way toward settlement. James Doyle, treasurer of the Portland Company, and several of the large shareholders have secured an option of sixty days on the Granite mine, and it is probable that the property will be purchased before the option expires. The litigation between the companies is due to both of them laying claim to the apex of the Bob Tail vein.

A new plant of heavy machinery is being erected on the Vindicator mine on Bull hill, one holding of the Vindicator Gold Mining Company. The new plant will consist of a four-drill compound air compressor, a 10x14 hoist, good for 1500 feet, two 100 H. P. boilers and a cage. The working force of fifty men will be increased to one hundred when the machinery is in place. The 300-foot station in the main shaft is completed and the drifts are being extended both east and west, opening up large bodies of stoping ground. The output for February was 700 tons of ore and the March output will reach from 1000 to 1200 tons.

The bond and lease on the Squaw mountain tunnel were this week purchased from R. M. Maloney, E. L. White and J. Cooper by D. Curry of London, representing a wealthy Scotch syndicate. The bond to the tunnel company from the owners was for $200,000 and the consideration for the transfer was a cash payment of $40,000. The lease originally granted was for two years and there are yet eighteen months of unexpired time. About two months ago the buildings and machinery at the mouth of the tunnel were destroyed by fire, since which time the bore has been driven by hand and has reached a distance of over 1600 feet into Squaw mountain from the southwest. Several rich veins have already been cut by the bore and different sets of sub-lessees have been making numerous shipments from them. The new owners have ordered a new plant of machinery, consisting of one six-drill compressor, four Eclipse-Ingersoll drills, and two 80 H. P. boilers.

The United States & British Columbia Mining Company have taken a one-year lease on the Los Angeles mine on Bull hill.

Colorado Springs capitalists have been granted an eighteen-months option on the Marguerite lode, in Poverty gulch, by the Marguerite Consolidated Mining Company. The price to be paid is $20,000 and the lessees agree to work forty shifts per month and pay 20 per cent royalty on ore extracted.

In order to cut the Lincoln vein a new 170-foot shaft will be sunk.

GILPIN COUNTY.

(Special Correspondence.)—The U. S. M. property, which parallels the gulch at Central City, is being developed under the management of W. H. Knowles. The present depth of the shaft is 250 feet, with workings at the 150-foot level.

The large producing mines in Russell gulch are the Saratoga, Frontenac and Aduddel. The Saratoga, belonging to the Saratoga and Cyclops Gold Mining Company, is sinking a cage shaft, which has reached a depth of 800 feet. Its March shipments amounted to 100 tons of ore.

The Frontenac produces a silver-lead ore, and shipments amount to 150 to 200 tons per month. This property is worked under a system of leases.

The Aduddel mine is on the same vein as that of the Frontenac. Shipments equal about 150 tons per month. It will be seen that these three principal mines of Russell gulch produce practically no free milling ore, which is a departure from the ordinary Gilpin county proposition.

The mines and mill of the Vendome company are keeping up a good record of production. Their ores are of two classes—one heavy in lead, and the other pyrites of iron, the gold in which is quite free, though the amalgamation is freer in the iron ores than in the lead. The Vendome has been a producer for fifteen years.

In Gilpin county, with ore from the recognized free-milling belt, a mining company, having its own milling facilities, can produce its ore, mill it, and reduce it to bullion at a cost of $2.50 per ton.

The Queen of the West, in Chase gulch, is under the management of C. M. Shaw. The old shaft has been retimbered and sunk to a depth of 370 feet. A new pumping plant has been put in, and new hoisting machinery is contemplated. The sinking has been on the vein, which is said to be 5 feet in width. The ore is mill dirt.

The Concrete, on Grinnell hill, is working with a force of fifty men, and outputting fifty tons of ore per day. Drifts are being run east and west at a depth of 1200 feet.

The Kansas-Burroughs mine, on Quartz hill, is shipping from fifty to sixty tons per day, and is developing with the view of making a larger output.

The stamp mills and concentrating plants of the district are operating at about full force, and as spring work opens they will have all they can do.

The Rocky Mountain concentrator is conceded to be filling a good office in the district. It puts rebellious ores into such form as make them desirable to the smelters, which make practically no treatment charge.

Pine creek district, lying about seven miles west of Central City, is making steady progress, and the town of Apex presents a busy appearance. This district is more than 1000 feet higher than Central City and the snows have been heavy there the past winter. Notwithstanding some disadvantages, there is much work in progress and a good many properties are being equipped with machinery. Among the tunnels being opened are the Annie H., Lessie B. Davis, Fourth of July, Booster, Nancy Hanks, Gilbert, Schultz-Wonder, Martin, Cora, Calhoun, St. Louis, Zang, Sechrist and Bob Davis. Among the shafts equipped with machinery and being sunk are the Plateau, Mascotte, Manchester, Anter, Nancy Lee, Stamboul and Moose.

The W. J. Chamberlain sampling works at Blackhawk, which were destroyed by fire a few weeks ago, are being rebuilt on a much larger csale.

CLEAR CREEK COUNTY.

At Idaho Springs the Mixsell mill is being enlarged from fifteen to thirty stamps.

Andrew Anderson has just completed a new milling plant. Its capacity will be about twenty-five tons in twenty-four hours.

WASCOTT.

NEW MEXICO.

At the Red River mining district, fifteen miles northwest of Elizabethtown, the veins are reported numerous and wide. The ore is a hematite, some being oxidized and free milling, but not enough work has yet been done to thoroughly demonstrate whether the milling ore will last to any great depth, most of the holes being only from 15 to 25 feet deep. About 800 men are at work on producing mines and prospects for wages. No work of any importance can be done there much before the middle of April, as there are 2 feet of snow on the ground now, and several prospects which are in ore are unable to work on account of the snow. The extent of the district has not yet been developed, but probably the mineral belt extends not less than thirty miles in a northwesterly direction. The line of the Maxwell land grant is about four miles south of Red River City, and some good finds have been made within the grant. The grant owners have given prospectors the same privileges that are accorded by the United States laws for one claim, but retain all extensions of any vein discovered.

Las Vegas *Optic*: At Hopewell the Cinnabar Mining Company have their new shaft down 150 feet. They will commence drifting at once to cut the main lead.

On the Little Mary mine, owned by the Eureka Mining Company, in drifting from their main shaft, they have cut a 7-foot lode and have drifted 100 feet on it and are taking out ore.

On the Good Hope property, owned and worked by Burlington railway officials, they have their tunnel in 300 feet and are pushing ahead to cut the main lode.

The Gold Nugget claim in Jones gulch, shows four distinct lodes, running in width from 2 to 8 feet.

Silver City *Enterprise*: W. H. Newcomb has started shipping iron ore from Legal Tender hill, just outside the city limits. He is shipping two cars per day.

A new strike of importance is reported from the west side of Pinos Altos mountains; or it might be called a rediscovery of a long lost mine. Judge J. W. Ball discovered it in 1867 but no one knowing much about silver it was abandoned. After some ten years he made fruitless efforts to discover it. The vein is 4 to 5 feet between the walls.

At the Mogollon the main shaft on the Confidence mine has attained a depth of 452 feet. Work on sinking has been suspended until better hoisting facilities are provided.

There are eight men employed on development work upon Maud S.

ARIZONA.

Republican: The new mill of the Buckhorn Mining Company in Buckhorn Basin is now complete.

Manager McLane of the Senator Mining Company in the Buena Vista district says that they have several shafts sunk varying from 50 to 200 feet and all of them have encountered rich ore. A large stamp mill will be put in soon.

The Black Warrior Copper Company is formulating plans for reduction works and other improvements of their properties.

The Baxter mines in Pima county have made a shipment of copper ore averaging 27 per cent.

On April 1st work was begun on the Lacey-Falson copper properties in the Silver Belt district, by H. Sissons.

Supt. W. Jackson of the Pinto Creek Mining and Smelting Company reports that at 100 feet the tunnel on the Yo Tambien has struck very rich sulphuret ore, the breast of ore being 5 feet in width.

Prospectors are scouring the district in the vicinity of the King of Arizona and valuable finds and locations are reported.

In the Sierra Pintado region in the northwestern part of the district of Altar, close to the Arizona line, some very rich gold discoveries have been recently made.

N. Galles is putting in a cyanide plant on the Santa Maria property owned by the Swiss Belle Company.

Dr. Plank is about to build a mill on Silver creek in the San Francisco mining district.

The Co-Operative Mining and Milling Company on the Auga Fria has completed its pipe line and the mill has been started up. The pipe line is 8,000 feet in length with a 201-foot head, the pipe being from 12 to 15 inches in diameter which gives them 100 H. P. Electricity is generated from a large dynamo by this water power. The mill has ten stamps and the company has ore enough in sight now to keep it in operation for four months. Their deepest shaft is as yet only 120 feet deep but they have a body of ore in it 20 feet wide, the vein running from 3 to 20 inches in width.

ALABAMA.

E. A. Smith, State Geologist and secretary Alabama Ind. and Sci. Society, Anniston, Alabama, reports that the mineral industry of Alabama during the month of February, 1897, resulted in the following productions:

	Tons.
Coal	402,726
Coke	96,343
Iron Ore	214,135
Pig Iron	59,201
Limestone (for Flux)	19,140

SOUTH AFRICA.

The following from the report of the Van Ryn is a good example of the close working of some big mines on the Rand with small profits:

Milling—Owing to the scarcity of labor the available hands were employed in the widest stopes, where the rock is broken with the least labor. The yield per ton in the mill has on account of this been only 5.4 dwts. The run of the mill has been a good one, considering that it stopped over Christmas Day for 24 hours. Since the receipt of these particulars from the manager the labor supply has increased, and we are advised that during January a profit of £228 was made. For February a higher percentage of the ore is now being sorted, and the results are expected to show considerable improvement. December: 80 stamps ran 29 days 14 hours, ore crushed 10,141 tons, crushed per stamp per day 4.3 tons, amalgam won 8956 ounces, bullion gold 2750 ounces, yield per ton in bullion gold 5.4 dwts. Cyanide works: The extraction of the cyanide works has been better than November, being 74 per cent. December: Tonnage treated 6400, yield in bullion gold 837.37 ounces, yield per ton 2.659 dwts, theoretical extraction 73.7 per cent. Ore at surface, December, 3613 tons. Native labor: All work on the property has been impeded by the scarcity of native labor. At present it is difficult to engage boys except through agents, and almost as difficult to keep them. The Pass Law does not prevent the boys from clearing. It causes great expense and inconvenience without giving protection.

ACCOUNTS.

I—COST OF PRODUCTION GROSS AND PER TON MILLED.

	December, 1896. *Gross.*	*Per Ton.*
Mining	£ 6,756 19 5	£0 13 3.91
Transport		
Milling	1,690 13 2	0 3 4.01
Maintenance	813 7 1	0 1 7.24
Redemption	1,923 12 0	0 3 6
General charges	255 0 0	0 0 6.03
Totals	£11,439 11 8	£1 2 3.19
Cyanide works	1,156 17 0	0 2 3.38
Total costs	£12,596 8 8	£1 4 6.57
Realized per ton		1 4 4.91
Loss per ton		£0 0 1.66

II—REVENUE.

	December, 1896. *Ozs.*	*Value.*
Gold, at 73s 3d	2913 30	£ 9,338 0 0
Cyanide process	837.37	3,038 19 11
Totals	3750.67	£12,376 19 11
Rents		45 5 0
Total revenue (per ton, 24s 6d)		£12,422 4 11

Scientific Progress.

Ascending the Highest Peak of the Andes.

The highest mountain of the American Andes, Aconcagua, 24,000 feet high, has been ascended. On Jan. 14th Zurbriggen, the Swiss guide of the Fitzgerald expedition, stood on the summit—an elevation of more than 24,000 feet above sea level. He has thus anticipated the feat upon which Mr. Fitzgerald had set his heart, and for the accomplishment of which he organized the expedition. The difficulties of the ascent were numerous. The cold was intense, and apparently interminable slopes of snow stretched upward and mocked the hopes of the weary climbers. But this was not all. "Mountain sickness," due to the thinness of the air, also tested their physical powers and endurance. It must be a great mortification to Mr. Fitzgerald that the superior physical powers of his guide carried him to the summit before his courageous leader, but illness for a time forbade further struggle on the part of the latter.

Mr. Fitzgerald and his party set out for the ascent of the mountain on Dec. 23rd, expecting to reach the summit four days later. On the 25th the party bivouacked at an elevation of 19,000 feet, on the neck of the mountain, in a gale of wind and snow. All suffered from sickness and the intense cold. Next day two porters had to be sent back ill. Zurbriggen, whilst prospecting around, found Gussfeldt's card in a tin box, dated March, 1883. This was at a height of 21,000 feet. The Russian furnace, upon which so much of the comfort of the party depended, would not act, and exploded. Thenceforth, there was no hot food, which was a serious deprivation, and this want forced the party to descend to the valley on the 27th. There they remained three days to recruit, meanwhile sending up wood and water to the neck of the mountain in readiness for another attack. On the 30th they braced themselves for a second attempt. The boiling thermometers were useless, for they were not rated high enough. During three days the lowest temperature was 5° Fahrenheit; the highest, in the sun, 26.46°. On the 31st they were struggling painfully upward, and Zurbriggen's feet became frosted. They had to halt for two hours in consequence. After constant rubbing, they succeeded in restoring circulation. Struggling upward, a height of 22,500 feet was reached, and then exhausted nature gave in. They returned on Jan. 2d to the starting point to recruit. On the 9th they made a third attack on the mountain, the cold then being intense. On the 14th a height of 23,000 feet was gained, and there, unfortunately, Mr. Fitzgerald had to turn back ill, when only about 1000 feet from the summit. It was very mortifying. Zurbriggen continued the ascent and stood on the apex at 5 o'clock.

Zurbriggen's feat crowns all similar achievements. Humboldt, in 1802, climbed Chimborazo (19,000 feet), and in 1890 was followed by Mr. Whymper, whose record as a climber is familiar to all. Among the Himalayas, in 1892, Sir Martin Conway climbed Pioneer Peak, estimated at 22,000 feet, and Mr. Mummery and Mr. Hastings reached 21,000 feet on Nanga-Parbat. Only a very sanguine climber can indulge in the hope of scaling Mount Everest (29,000 feet) and Dapsang (28,700 feet) which tower above the giants of the Himalayas.

In a recently patented process a thin film of gutta percha is applied to a sheet of paper or fabric, and when the surface thus covered is laid on another surface and submitted to heat and pressure a union is effected by the melting of the gutta percha, which when cool again joins the two surfaces strongly and effectually. It can be used advantageously in bookbinding, backing and mounting paper, making card and mill board, pasteboard, etc., and mounting photographic and other prints. Sensitized photograph papers thus coated on their posterior sides may be used like ordinary sensitized papers, the gutta percha having no effect on the chemical baths. These products preserve their adhesive properties indefinitely under the influence of high temperature and may be used at any period after their manufacture.

Electrical Progress.

Electrical Mining Hoists.

At the Free Silver mine, at Aspen, Colorado, is an electrical hoist, rated at 125 H. P., but capable of applying to the hoisting machinery power to the extent of 200 H. P. This is the largest electrical hoist in the world. It is a double-reel flat-rope overbalanced hoist, built after the designs of Mr. D. W. Brunton, manager of the Free Silver Mining Co., and also of the Cowenhoven tunnel, Della S., Alta Argent and Johnson mines.

The electrical equipment consists of one General Electric Company's 100-kilowatt multipolar motor, with a speed of 550 revolutions per minute, and a smaller motor of similar type of 60 K. W. capacity and a speed of 475 revolutions. This smaller motor is ordinarily used to run an air compressor and winch for pulling ropes, but in case the main hoist motor is called upon for heavier work than usual the smaller one can be thrown in gear with it.

The hoist being counterbalanced the load on the motors is reduced to about one-third of that which would be thrown on a plain hoist of the same capacity. The radius of the arms of the reels is 5 feet, each reel carrying 1500 feet of rope 4 in. wide and ⅝-in. thick. The hoist is provided with a car and cage, and the loaded car and cage weigh about 5000 lbs. As in sinking the mine it cannot be timbered entirely to the bottom, and the cage cannot go below the timbering, a bucket is hung below the cage. This is 35 in. high and about 28 in. in diameter. It weighs 400 lbs., and holds 12¾ cu. ft. of water weighing 800 lbs. or rock weighing 2000 lbs. To relieve the shaft from a sudden inflow of water, this hoist is provided with a bailer, which is used as an adjunct to the pumps. This is 4 ft. 2 in. by 3 ft. 2 in. by 8 ft. 4 in. and weighs empty 1950 lbs. and filled 8880 lbs. The counterweight used with the cage and bucket is 2450 lbs.; with the cage and car 2675 lbs. With the bailer these two weights are used, making a total counterweight of 5125 lbs. The maximum hoisting speed with the cage and car, and using the small piston on the motor, is about 600 feet per minute; with the bailer, and using the larger pinion, about 1000 feet per minute. The voltage used is 525 volts, and the current is taken from the central station at Aspen.

Last summer an interesting test was made with this hoist when using it for bailing. At that time the mine shaft was 835 feet deep, a depth to be ultimately increased to from 1200 to 1500 feet. The condensed figures showing the operation of this hoist during the test are as follows:

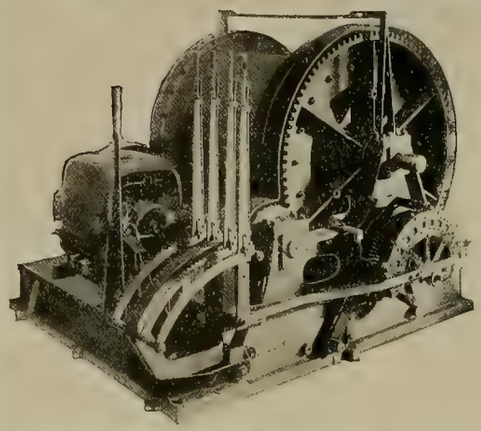
HOISTING.

Weight of bailer, 1950 lbs.; water, 6930 lbs. Total	8880 lbs.
Counterweight	5125 lbs.
(Ropes balance, considering entire trip.)	
Net weight raised	3755 lbs.
Depth of shaft	835 ft.
Work, 3755 x 835	3,135,425 ft. lbs.
Time hoisting	2.25 min.
Foot-pounds per minute	1,393,521 ft. lbs.
Mechanical H. P., 1,393,521 ÷ 33,000 =	42.2 H. P.

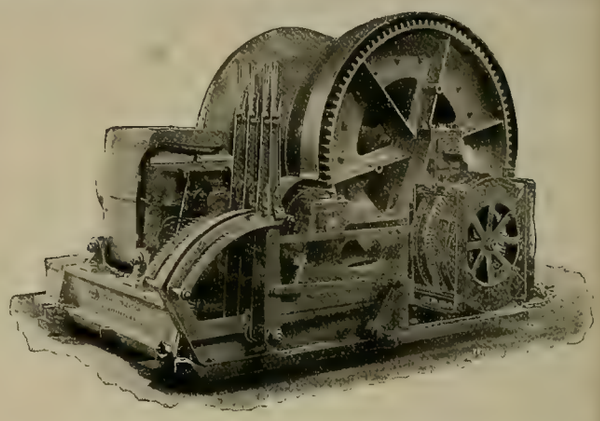
LOWERING.

Counterweight	3175 lbs.
Weight of bailer empty	1950 lbs.
(Ropes balance, considering entire trip.)	
Net weight	3175 lbs.
Depth of shaft	835 ft.
Work, 3175 x 835	2,651,125 ft. lbs.
Time of lowering	2.25 min.
Foot-pounds per minute	1,178,277 ft. lbs.
Mechanical H. P., 1,178,277 ÷ 33,000 =	35.7 H. P.

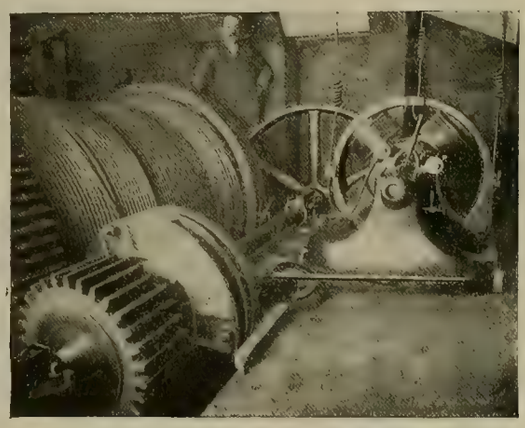
At the Alta Argent mine, also at



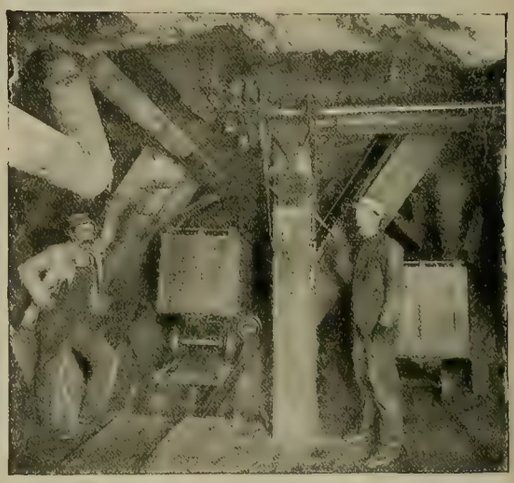
ELECTRIC HOIST, PLEASANT VALLEY COAL CO., CASTLE GATE, UTAH.



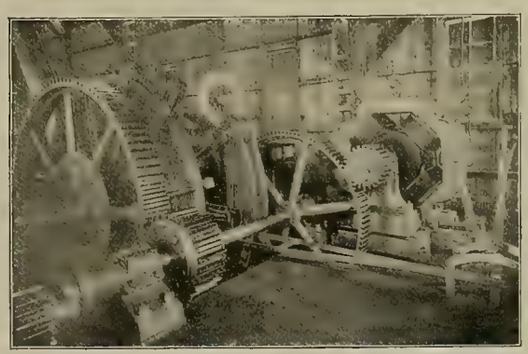
ELECTRIC HOIST, PLEASANT VALLEY COAL CO., CASTLE GATE, UTAH.



ELECTRIC HOIST, ALTA ARGENT MINE, ASPEN, COLO.



HEAD OF INCLINE, ALTA ARGENT MINE; HOIST CONTROLLED FROM THIS POINT.



OVER-BALANCED ELECTRIC HOIST, FREE SILVER MINE, ASPEN, COLO.



ELECTRIC HOIST IN MALTBY COLLIERY, LEHIGH VALLEY COAL CO., WILKESBARRE, PA.

Aspen, Colorado, is another hoist. This is placed at the head of the incline. The current is taken from the power plant of the Roaring Fork Electric Light and Power Co., three and one-half miles distant, two miles being above the ground and one and one-half miles through the Cowenhoven tunnel and mine workings. This hoist is also overbalanced and is equipped with a General Electric Company's multipolar slow-speed 500-volt motor, having a capacity of 20 H. P.

The location of this hoist has been arranged with an eye almost exclusively directed to the convenience of handling the cars. The hoist is placed on a platform about 10 feet above the level at the head of the incline, where the ore cars are stopped and run off after being hoisted. Here the hoist operator stands and handles his controlling levers and reversing switch. This arrangement gets the hoist out of the way, while it allows the operator to attend to the cars. In the case of other hoists at Aspen, the hoist is placed directly at the head of the incline. This relegates the operator to the back of the hoist, where he can see both shaft and rope when hoisting and lowering. To attend to the cars he would be compelled to pass around the hoist, and as this entails a loss of time, a second man to handle the cars is usually necessary. At the Alta Argent one man suffices to operate the hoist and handle the cars.

In the mines of the Pleasant Valley Coal Company of Castle Gate, Utah, is another direct current mine hoist, used for hauling the coal cars up the incline. This hoist is a double-reduction single-drum hoist, equipped with a standard L. W. P. 20 H. P. railway motor and double 51 rheostat. It is designed to lift 4000 lbs. 500 ft. per minute. The drum is 47 in. in diameter and 36 in. face, with two brake bands in V-shaped grooves on the drum. It is provided with both friction and positive clutches and is operated by five levers—one for the rheostat, one for the friction clutches, one for the positive clutch and two for the brake. The dimensions of the base, on which are mounted the drum, motor and controller, are only 78 in. by 95 in. Another hoist of similar pattern, but using a friction clutch only and a G. E. 2000 motor with a double 83 rheostat, has recently been added to the very complete mining equipment of the Pleasant Valley Coal Company. The motor in this case is fully enclosed.

The three hoists just mentioned are in the West. In the mines of the Lehigh Valley Coal Company, at Maltby, is the direct current electric hoist shown in the illustration, very similar to that at the Castle Gate colliery. The dimensions of the drum are the same, the G. E. motor is of similar capacity, but the controller is of the N. R. type with packed ribbon rheostats mounted separately from the base. It is designed to hoist 5000 lbs. at a speed of 500 feet per minute.

All these hoists are and have been in constant service for months without serious hitch or stoppage beyond those necessitated in ordinary mine service.

Practical Information.

Packing Goods for Mexico.

The following paragraph is from the annual report of Consul Oliver of Merida, dated January 19, 1898:

"This section of the Mexican coast, from Progreso to Vera Cruz, being absolutely devoid of safe harbors, compels me to again remind exporters to pack their goods more securely, so that they may stand the rough handling to which they are invariably subjected in their transfer from the ships to the lighters, by reason of the rough, open sea and the "northers" which visit this coast during five months of each year. The merchants here are unanimous in their complaints regarding the careless manner in which all merchandise from the United States is packed. They further state that, by reason of this carelessness, they have lost a large amount of trade, which has gone to Europe, where all merchandise is skillfully and securely packed, with an eye single to the conditions referred to."

JAMES MEIKELJOHN of Rhinelander, Wis., has invented a novel form of crosscut saw, which is an endless chain affair. It is adapted to the cutting of large timber, and, it is claimed, will go through a good-sized stick in thirty seconds. It will cut down trees of any size up to 10 feet in diameter, and cut the tree into desired lengths. The saw teeth travel round a steel frame, 3½ feet long and 6 inches high, rounded at the ends, and about as thick through as an ordinary rotary. Power is transmitted by a sprocket wheel at the shaft end of the blade. The saw can be raised and lowered at will. In use it is simply rested on the log, and quickly does its work. Compressed air, electricity or steam can be used to operate the saw. By using an extended shaft it can be used to cut off piles under water.

AN unusual incident recently occurred in the timber near Fossil, Or. Beaber and French sawed through a tree measuring 13 feet in circumference, and though they sawed until the teeth of the saw came through on the opposite side; though the tree top was free from all support; though they pried and chopped and wondered and talked, still that tree stood there, and still the saw remained pinched in so tightly that it could not be moved. At last they were obliged to go home, leaving the tree standing on its stump. Next day the tree was down. It had apparently sprung or slid from the stump, striking perpendicularly in the sandy soil at first, making a hole 5 feet deep and as far across.

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IS
Wanted,

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PURE RUBBER BOOTS
Are the CHEAPEST because
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CAPITAL, - $550,000.
The Original Cyanide Process.
SIMPLE. RELIABLE. ECONOMICAL.
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Gold Medal, Columbian Exposition, 1893.
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Advisory Board in the United States: Geo. A. Anderson, General Manager; Hugh Butler, Attorney; W. S. Ward; J. Stanley Muir, Technical Manager.
California and Nevada Agent, Bertram Hunt, 216 Sansome Street, San Francisco.
OFFICE: McPHEE BUILDING, DENVER, COLORADO.

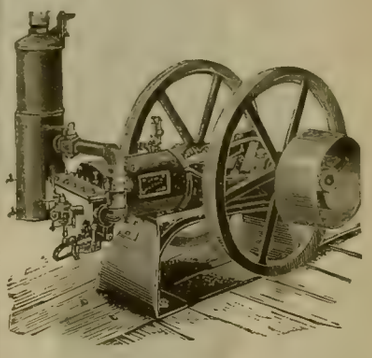
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Write for estimates on complete Milling, Mining and Reduction Plants.

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226 MARKET ST., N. E. Corner Front (Up Stairs), SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential*

Cheap
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SAVE MONEY BY USING
—THE—
"DANIEL BEST"
Crude Oil Engine.

This Engine can be operated on either Crude Oil, Distillate, Gasoline, or Kerosene. **It is the cheapest power on earth** and is not tied to any one kind of Oil, but can use any kind that will make gas and is not handicapped by being compelled to use a certain Oil. Do not forget this when in need of an Engine.

We guarantee our Engines to work perfectly on California Crude Oil, or Distillate, or any other kind of gaseous Oil; we however prefer CALIFORNIA CRUDE OIL, from Coalinga, Fresno county, for the reason that gas from Crude Oil will produce more power from the number of feet of gas used than from any other Oil, and it is also a natural lubricant as well, the valves being always lubricated sufficiently to prevent them from sticking, thus assuring greater durability of the working parts than it otherwise would be in using dry gas. And another advantage we claim is, that danger from explosions is reduced to a minimum, there being no accumulation of gas, but is used by the Engine as fast as it is generated and hence is absolutely safe. The following is a test that we made with one of our Five-Horse Power Crude Oil Engines, running ten hours on the different gas oils:

California Crude Oil, 40 grav.,	7½ galls.	at	5c.,	$.37½
Distillate.....40	7½	"	8c.,	.60
Domestic Coal Oil....40	7½	"	12½c.,	.93¾
Gasoline.....74	8¾	"	15c.,	1.31¼
City Gas.....1000 feet,				2.00

We manufacture all sizes from two-horse power up, and will guaranteee that our Engines will run cheaper and are more simple in construction, have fewer parts and hence are more durable than any other Gas Engines on the market. Seeing is believing; don't take our word for it, but come and investigate for yourselves. You can always see one in operation at our works. We will be pleased to see you and will at all times take pleasure in showing them up. Our Engines are specially adapted for running well and mining machinery—in fact, for any kind of power desired. We are the pioneers and first inventors of Crude Oil and Distillate Engines. **We always lead and never follow.** Send for Catalogue and Price List of the only genuine Crude Oil and Distillate Engine made.

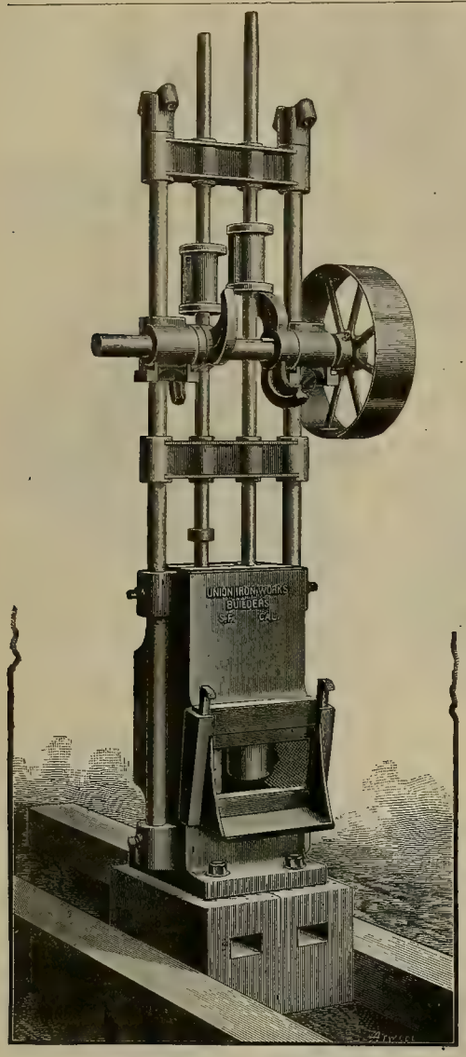
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Two-Stamp Self-Contained Battery

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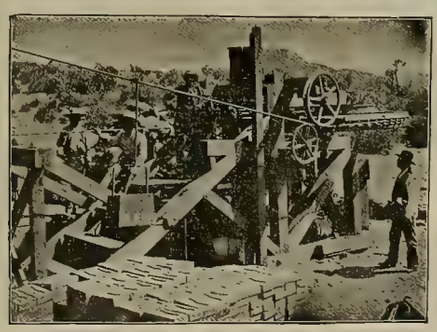
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It was awarded First Prize at the recent Mechanics' and Manufacturers' Fair, where it was in daily operation, crushing ores from various mines throughout the State.

Weight of stamps, 275 pounds each; capacity of battery, determined by actual work, 200 pounds per hour, through a No. 7 slot-punched screen.

Entire battery weighs about 3000 pounds; heaviest piece, mortar, weighing 1200 pounds.

Can be taken apart and transported to any locality.



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Parties desiring to remove large quantities of Sand, Gravel, Earth, Ore, Rock, to construct Dams, Levees or Embankments, etc., can do more efficient work at less cost by the

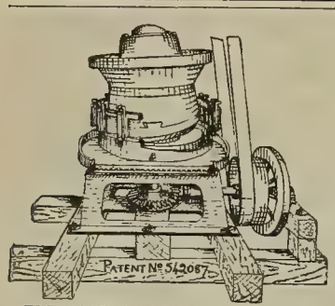
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FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 220 Market St., San Francisco.

Coast Industrial Notes.

—The Salinas, Cal., beet sugar factory will cost $2,000,000.

—Upwards of 900 carloads of beans from last year's crop remain over at Ventura, Cal.

—The San Timateo, Cal., oil "boom" is done, and the last derrick has been shipped back to Los Angeles.

—Over ten miles of the new Sierra Railroad from Oakdale to Sonora, Cal., is graded, and a mile of track laid.

—The Oregon Short Line has sent in engineers to see if it is feasible to build a road from the south into the Seven Devils copper district in Idaho.

—An attempt is being made to make telephone connections between San Francisco and Yreka. The lines running from Yreka to the west in the mining districts of the Klamath and those connecting Sisson with Redding will probably be joined.

—The Risdon Iron Works is pushing work on the iron structure of the new Union ferry depot at the foot of Market street, San Francisco. President Colnon, of the Board of Harbor Commissioners, thinks that the building will be completed within a year.

—The salmon fishing season on the lower Columbia opens to-day. The usual "strike" is on, the canners offering 4 cents per pound, the fishermen demanding 4½. About the 1st of May one or two of the canners will accede and then the season's work will fairly begin.

—The Redlands, Cal., Light and Power Company proposes to issue $50,000 in stock, half to be bought by citizens and the other half to be retained by the company, for the purpose of substituting electricity for mule power upon the street railways in that town.

—Riverside, Cal., claims that the running expenses of the city electric plant are $1150 per month, and there is a revenue of $670 a month, leaving $480 as the cost of running eighty-four arc lamps. This, however, does not take into account interest on cost or depreciation of plant.

—The Power Development Company has built a flume along the wall of the canyon to the location of the power house, fifteen miles from Bakersfield, Cal., with a capacity of plant of 10,000 volts. The cost of the work has been nearly $175,000 and the power is expected to be sufficient to run all the local machinery.

—On Thursday, the 8th, C. P. Huntington was re-elected president of the Southern Pacific Company. The report shows that the gross earnings for the twelve months ending Dec. 31st last were $48,656,419, as against $50,457,022 for the year 1895. The expenses were $31,961,916, as compared with $33,242,398 for 1895.

—C. P. Huntington of the Pacific Mail says he intends to add a new steamer to the China run to replace the City of Rio Janeiro and Peru, which are considered too slow. He intends to build a 10,000-ton vessel, to cost about $1,500,000. He says the construction of the vessel will soon be begun at Newport News, where he owns a large shipbuilding plant.

—The committee to raise subscriptions for the proposed railroad from San Diego to the back country has obtained signatures for over $10,000. The total cost of the road is estimated at $200,000, and $20,000 must be subscribed. Besides these subscriptions of stock, a subsidy of 700 acres of land in Santa Maria valley has been given, and many farmers have agreed to do work at grading, taking one-half cash and the other half in stock.

—The success of the Joggen's log rafts from the Columbia river in '95 and '96 has occasioned the formation of a combine of San Francisco lumber mill men, who have bought out Baines & Robertson, and propose bringing down two large rafts this season—one in June and one in August—from the Columbia river, each containing about 7000 M feet, board measure. They figure a large saving in freights and the utilization of considerable refuse.

—The Atlantic & Pacific Railroad will be sold at auction on May 3, at Gallup, N. M., to the highest bidder. No bid of less than $5,000,000 will be entertained by the auctioneer. It will be purchased, no doubt, by the Santa Fe people. The Atlantic & Pacific runs from Albuquerque to The Needles. From the latter place to Mojave Junction the Santa Fe has been operating the Mojave division of the Southern Pacific, which it will purchase next month. Large sums of money will certainly be spent in improvements on this through line. The roadbed will be braced up and a new line of telegraph constructed from Barstow to Los Angeles, which, while not a part of the Atlantic & Pacific, is its near relation.

—F. R. Lingham, head of a large lumber firm in Johannesburg, South Africa, is in Seattle, Wash., to place an order for 20,000,000 feet of lumber. Within the past eighteen months Lingham has shipped nearly 30,000,000 feet of lumber from Puget sound to South Africa. The vessels will carry, also, cargoes of heavy merchandise from San Francisco, where an order for 4000 tons of mining machinery was lately placed. Four hundred tons of this machinery is to be taken back by each ship, in addition to the regular lumber cargo. By the end of next year most of the wheat and flour consumed in the Transvaal and other South African States will be purchased and shipped direct from the Pacific coast.

Recently Declared Mining Dividends.

Morning Star Gravel Mining Co., Colfax, Cal., $5 per share; payable April 1.

Alice Gold and Silver Mining Co., Montana, $20,000; payable April 7.

Silver King, Utah, $37,500; payable April 10.

Personal.

CAPTAIN HENRY GLASS, U. S. N., has been detailed as captain of the yard at Mare Island.

EX-GOVERNOR BENJAMIN BUTTERWORTH of Ohio has been appointed Commissioner of Patents.

CAPTAIN THOMAS COUCH has returned to Montana from California, and is at his ranch at Great Falls.

D. J. BAUME of Butte, Montana, has been appointed superintendent of the Bald Eagle mines at Boundary, Wash.

A. MALTMAN of Grass Valley, Cal., goes to northern China to superintend the mining operations of an English company.

W. E. SHARON has been appointed superintendent of the American Flat Development Company at Virginia City, Nevada.

VICTOR CLEMENT, who has been examining the Mercur mine at Mercur, Utah, and the De Lamar in Nevada, has left for London.

W. C. QUINBY, representing the MINING AND SCIENTIFIC PRESS, leaves on the 29th inst. on an extended sojourn in Australia.

B. A. CARDWELL of Salt Lake is at Truckee, Cal., considering the feasibility of reduction works there to handle the Meadow Lake ores.

F. M. SOUTH was elected secretary, and L. L. Jewell treasurer of the Southern Oregon Miners' Association, at Grant's Pass, last week.

LIEUTENANT-COLONEL S. B. M. YOUNG of the Fourth Cavalry, U. S. A., has been detailed as superintendent of the Yellowstone National Park.

JAMES F. WARDNER of Wardner, Idaho, Rossland, B. C., etc., proposes to write a book of reminiscences of the bright side of mining life in the western part of the United States and British Columbia, with a chapter or two in Africa.

Commercial Paragraphs.

THE Colorado Iron Works has shipped one of their new single elliptical slag trucks to Leadville for the use of the Arkansas Valley Smelter.

STEELE, BRISTOL & Co., having purchased the right for Colorado to operate with the Beam Converting Gold and Silver Process, have erected a plant in Denver, Colo., to treat ore by that method.

THE Mine and Smelter Supply Company of Denver, Colo., are introducing the Wilfley concentrating tables in some of the old established stamp mills in Gilpin county, Colo., having lately put one in the Blackhaw mill at Blackhawk, Colo.

THE Montgomery Machinery Company of Denver, Colo., recently shipped an 80 H. P. boiler to Albuquerque, N. M., for the electric light works at that place; also, a hoister, crusher, boiler, ore feeders and concentrators, to White Oaks, N. M., for a mill in that district.

THE Risdon Iron Works, Howard and Beale, San Francisco, have issued the tenth edition of their catalogue, No. 8, "The Bryan Roller Quartz Mill," and "The Johnston Concentrator." In these the effort has been to still further advance the standard of efficiency. In the construction of the mill there has been an improvement in the manner of app'ying the motive power. Illustrated details of the mill and concentrator are fully set forth in the catalogue, which will be sent to any address.

BYRON JACKSON of San Francisco has a contract to furnish pumps and machinery for the Rockford, Illinois, water works. This California contract for an Illinois corporation was secured solely on merit, and suggests a good many things worth thinking about. There are three pumps with a daily capacity of 9,000,000 gallons, each driven by a cross compound single valve 100 H. P. condensing engine. The machinery in its entirety weighs thirty-six tons. The plant is to be in working operation June 1, '97.

Book Notices.

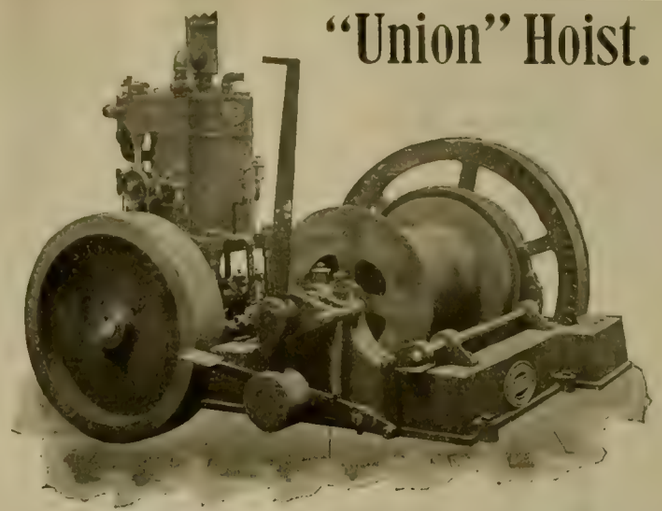
McNeill's Code: By Bedford McNeill, F.G.S. All telegraphic codes have the same purposes—to save costs in telegraphing, to ensure secrecy in confidential correspondence and to avoid liability of error. The author, a mining engineer, has made up the 4400 phrases given in the code with especial reference to the needs of mining men, engineers, directors of companies, bankers, brokers, accountants, financiers and merchants, all of whom will find this code economical and in other respects serviceable for their purpose. One of its special features is a schedule embracing the phrases required when surveying or reporting upon mineral property. Another is the system for transmitting full and detailed monthly reports from mines, smelters, etc., at very low cost, intelligently and safely. Besides answering these special purposes, this code meets all the requirements of general commercial correspondence. Published by the Scientific Publishing Co. and for sale by Henry L. Tyler, 207 Montgomery St., S. F. Price, $7.50.

Recent California Mining Incorporations.

Angus M. & M. Co., Los Angeles; capital stock, $500,000—all subscribed; F. H. Rust, I. N. Inskeep, J. J. Lonergan, B. M. Calkins, E. R. Shrader.

Uyak Mining Company, San Francisco; E. B. Pond, W. B. Bradford, C. Hirsch, R. Minor, H. T. Fortmann. Capital stock, $500,000.

"Union" Hoist.



The above cut represents our 10 h. p. Double Cylinder Engine of latest type, and Hoist combined on strong iron base. This hoist is designed to raise one ton 125 feet per minute from an inclined shaft, or 1500 pounds at the same speed vertical lift. The drum will hold over 600 feet of ⅝-inch cable. The outfit weighs 3500 pounds.

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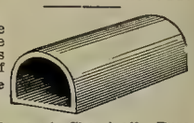
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This process has a well-demonstrated merit in treatment of low-grade Gold and Silver Ores, especially those of a complex character, talcose and clayey combinations or slimes, which class of ore, as is well known, cannot be treated by leaching or lixiviation.
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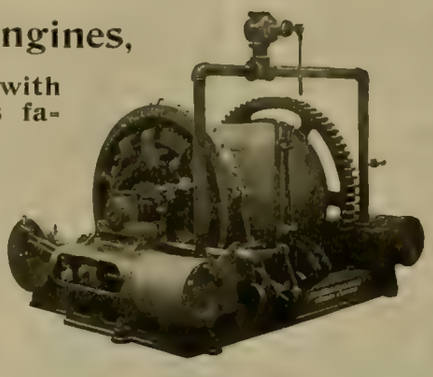
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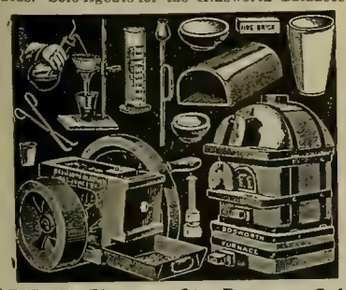
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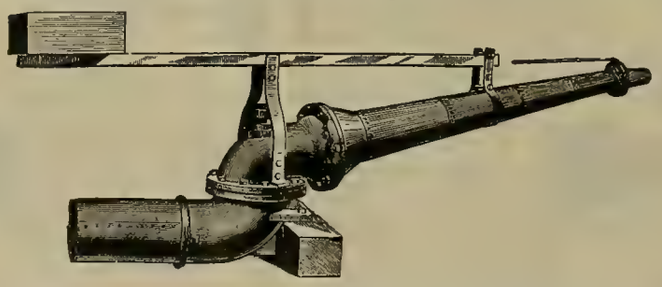
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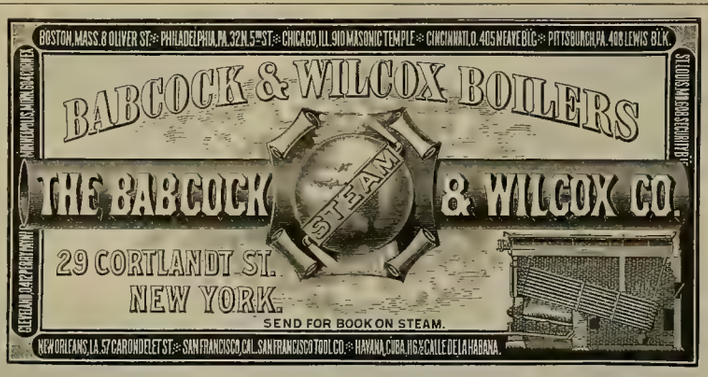
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List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MARCH 30, 1897.

579,873.—LAWN SPRINKLER—Hitchcock & Edwards, Los Angeles, Cal.
579,679.—CONCENTRATOR—C. A. Holmes, Seattle, Wash.
579,725.—INSULATOR AND HOLDER—W. C. Keithly, S. F.
579,758.—SWIMMING APPARATUS—W. Luce, Nehalem, Or.
579,888.—OIL CAN—S. I. Merrill, Los Angeles, Cal.
579,598.—ABSTRACT BOOK—G. C. Murray, Santa Rosa, Cal.
579,719.—HOISTING APPARATUS—W. F. Murray, S. F.
579,804.—HOSE COUPLING—G. W. Owings, Ritter, Or.
579,727.—HEAT PRODUCER—E. Turck, Anaheim, Cal.
579,729.—SPARK ARRESTER—H. H. Warner, Tacoma, Wash.
579,921.—IGNITER—G. L. Woodworth, Palo Alto, Cal.
579,813.—TRANSFER BRIDGE—A. McK. Wylie, Stockton, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

INSULATORS AND HOLDERS FOR ELECTRIC RAILWAYS.—Willie C. Keithly, S. F. No. 579,725. Dated March 30, 1897. This invention relates to a device for holding the insulators by which the trolley wires of electric railways are suspended. It has for its object a novel means for securing the insulator within a protecting cap or cover, and removably locking it thereto, and means for suspending the whole device from the posts which are designed to support the wires along their course. It consists essentially of a cap substantially of the form of a frustum of a cone having interior oppositely placed projecting lugs, a correspondingly shaped insulator having oppositely placed lugs upon the exterior adapted to engage and lock with those in the interior of the cap when the insulator is turned therein, lugs in the interior of the insulator, a shank or stem adapted to connect with and suspend the trolley wire, said shank having a winged disk adapted to lock with the lugs in the interior of the insulator, a protecting disk secured thereto below the mouth of the insulator. In conjunction therewith are hooks so disposed upon the top of the cap as to receive the transverse supporting wire and a groove or channel in the top of the cap in which this wire lies between the hooks.

HOISTING APPARATUS.—Wm. F. Murray, S. F. No. 579,719. Dated March 30, 1897. This invention relates to a hoisting apparatus such as is employed in conjunction with pile drivers for raising a weight and releasing it. It consists essentially in the combination of a winding drum, a driving gear with which it is forced into engagement, a shaft upon which the gear is fixed and the drum is slidable, means for resisting the thrust of the engagement of the drum with the gear so that the collar is prevented from rotating on the shaft. This means consists of concealed pins seated in tongues projecting inwardly and adapted to enter sockets in the shaft.

PONTOON TRANSFER BRIDGE FOR DIKES OR CANALS.—Alexander McKay Wylie, Stockton, Cal. No. 579,813. Dated March 30, 1897. This invention relates to the general class of apparatus used in making or dredging water courses, canals, ditches and other excavations and forming in connection therewith dikes and embankments bordering on the work. It consists essentially of a pontoon or float, a bridge connected therewith extending to and over the bank and having a support upon the bank upon which the projecting portion is supported, a car adapted to receive the material to be transferred from the dredger, means for effecting the travel of the car from the pontoon or float over the bridge and back again, means for automatically backing the car at the inner end of the bridge and pneumatic cushion cylinders with pistons so arranged and connected as to control the descent of the car over the curved portion where it delivers its contents. The car is provided with a swinging gate closing by gravity and latches which are disengaged to allow the gate to open at the proper time.

A Great Mining Triumph.

Capt. J. R. DeLamar, of New York City, is one of the largest owners and workers of Gold Mines in the world. After the most careful investigation he purchased in August, 1895, two Griffin Mills, and his report is so remarkable as to demand the careful attention of every one interested in Gold Mining.

We give it in his own words.

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BRADLEY PULVERIZER CO. *Gentlemen*:—The two Griffin Mills have been in operation now for 90 days on the hardest rock, with the exception of corundum, that I have ever met during my mining life. They have taken the rock direct from the breaker, and they average about 20 tons to each machine, 40 mesh fine, without elevating or bolting. We simply put a ¼ mesh screen around the Griffin Mill, and the stuff comes out 40 mesh fine or over, which makes it an excellent pulp for leaching by cyanide or chlorination; therefore we have concluded to order **10 more Griffin Mills.** We have tried high-speed rolls and dry stamps, and after looking into the Huntington Dry Pulverizer, the Narod Pulverizer, the Stedman Pulverizer, the Frisble Lucop, the Cook, and various other dry pulverizers, unhesitatingly recommend your Griffin Mill to any one.

Yours truly, (Signed) J. R. DELAMAR.

HOW 10 GRIFFIN MILLS WORK.

DELAMAR'S NEVADA GOLD MINING CO.,
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BRADLEY PULVERIZER CO. *Gentlemen*:—In answer to your inquiry as to what the "Griffin Mill" is doing at our DeLamar Mill, DeLamar, Nevada, we beg to state that we often run 310 tons per day with 10 of your mills in operation, and on one occasion these 10 mills produced 408 tons in one day. I have no hesitancy in stating that they will regularly produce at least 30 tons per day each on our ore, which is extremely and unusually hard.

Yours very truly, H. A. COHEN, *General Manager*.

These strong letters coming from such representative men are conclusive evidence that we are right in claiming that the "Griffin Mill" will produce a larger amount of finer pulp at less cost than any other stamp or pulverizer made.

Let us send you a free copy of our illustrated pamphlet, which will tell you all about the Mill and bring to you other evidence of its great achievements.

BRADLEY PULVERIZER CO., 92 State St., Boston, Mass.

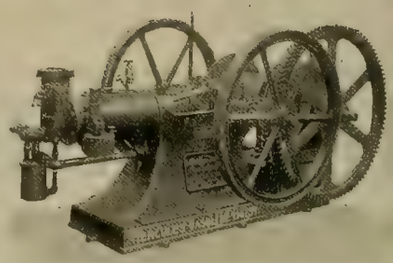
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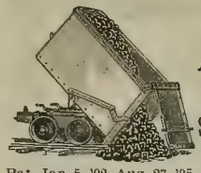
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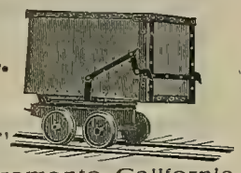
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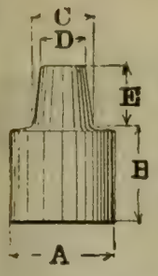
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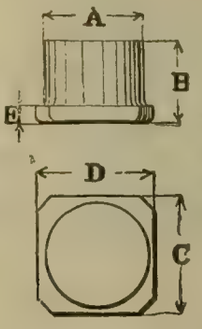
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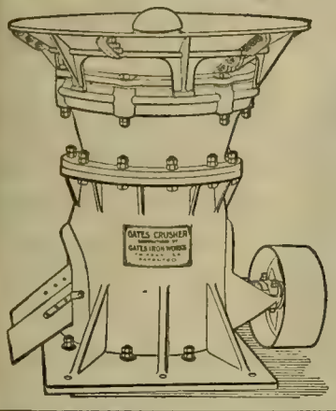
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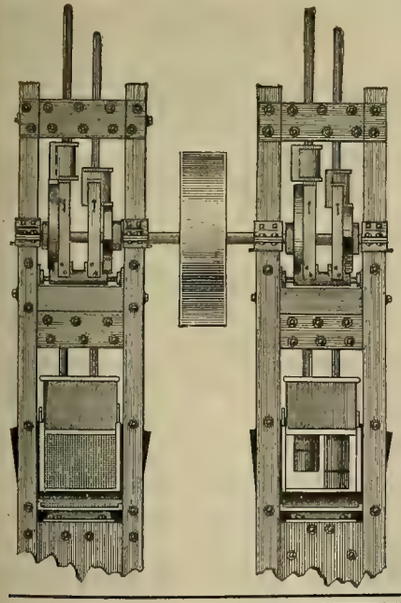
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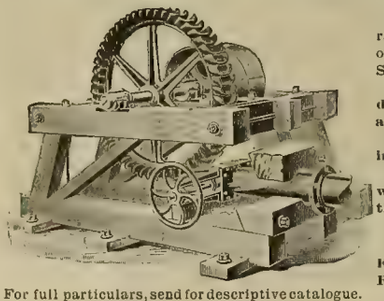
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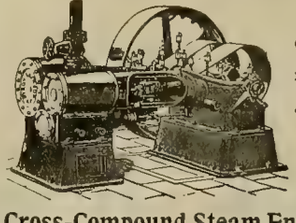
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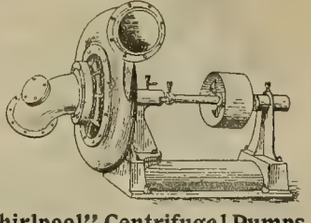
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That Our Annual Production of

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Our "Crown." WIRE.

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That of any other manufacturer in the United States and INCLUDES EVERYTHING in the Electrical Wire Line.

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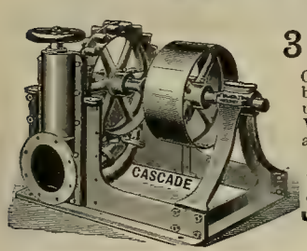
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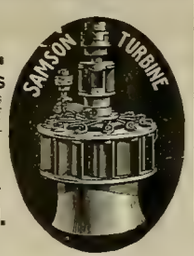
Adapted to all Heads from

3 Feet to 2000 Feet.



Our experience of 33 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

Send for a Pamphlet of either Wheel and write full particulars.



JAMES LEFFEL & CO.

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THE CHEAPEST PLACE ON EARTH TO OUTFIT A MINE

—IS AT—

THE J. H. MONTGOMERY MACHINERY CO., 1220-22 Curtis Street, Denver, Colo., U. S. A.



Just Listen—Reliable Common Sense Steel Whim, price reduced to $100. Steam Hoisters, $300 and up; hand hoisters $30; steel ore buckets all prices; prospectors' stamp mills $300. A 10-stamp mill, new, 850 lb. stamps, high mortars, latest improved. Only $800.



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Rock Drilling, Air Compressing, Mining and Quarrying

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100 Broadway, - - - New York, U. S. A.

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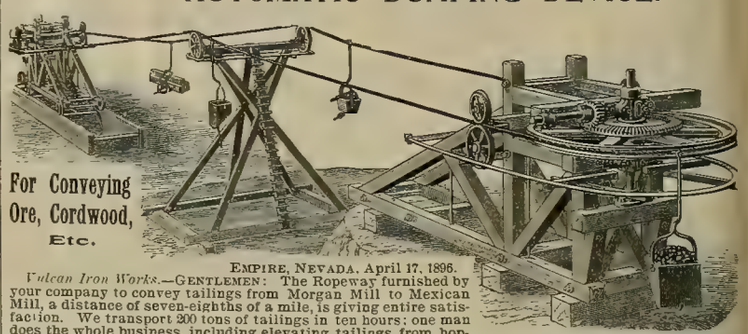
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—WITH—

AUTOMATIC ORE LOADER AND AUTOMATIC DUMPING DEVICE.



For Conveying Ore, Cordwood, Etc.

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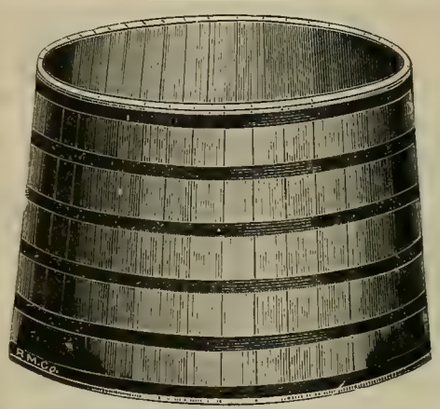
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Yours very truly, J. P. WOODBURY, Supt.

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WE ARE NOW MAKING

The Best Tank

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And Selling at

Prices Lower Than Ever.

IF INTERESTED, SEND FOR CIRCULAR AND PRICES.

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ALBANY

LUBRICATING COMPOUND

TWENTY-EIGHT YEARS' CONTINUOUS SERVICE in the great Mines, Steamships, Railroads and Mills all over the world prove it to be

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ADAMANTINE SHOES AND DIES

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CHROME CAST STEEL

Cams, Tappets, Bosses, Roll Shells and Crusher Plates.





These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

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H. D. MORRIS & CO., Agents, 141 and 143 First Street, San Francisco.

Special attention given to the purchase of Mine and Mill Supplies.



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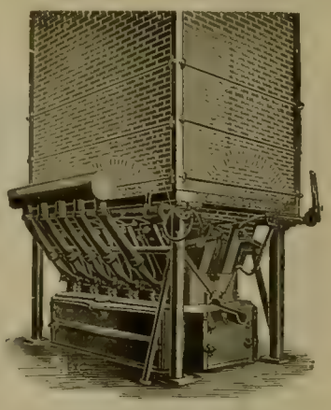
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LIGHT STEEL RAIL.

THE FINLAYSON PATENT WIRE ROPE TRAMWAY.

THIS TRAMWAY IS THE BEST THAT HAS EVER BEEN PLACED ON THE MARKET. IT HAS NO RIVAL. IT IS STRICTLY AUTOMATIC AND ITS CAPACITY RUNS UP TO 1000 LBS. PER BUCKET. ANY ONE CONTEMPLATING THE ERECTION OF A TRAMWAY SHOULD INVESTIGATE ITS MERITS BEFORE PURCHASING ELSEWHERE. . . . . .



Standard Silver-Lead Water Jacket Smelting Furnace.

Equipped with Arch-Bar System of Mantles, insuring rigid and strong walls. No Cracks.

THE COLORADO IRON WORKS COMPANY, Denver, Colo.

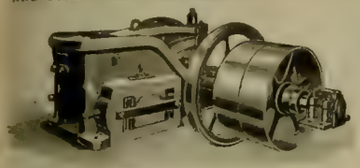
SOLE AGENTS AND MANUFACTURERS.

WE ARE MANUFACTURERS OF AND CONTRACTING ENGINEERS FOR

Gold, Silver, Lead, Copper and Pyritic SMELTING FURNACES.

AMALGAMATION AND CONCENTRATION PLANTS.

Investigate Our Late Improvements in ORE CRUSHING MACHINERY.
We Guarantee Capacity Per Day to Any Degree of Fineness. . . . . .



Improved Black Hawk Ore Breaker.

OUR PATENT HOT BLAST APPARATUS for all Smelting Furnaces is a Success. A great economizer of fuel, and enlarges capacity of furnace.

CONSOLIDATED Kansas City Smelting and Refining Co.

Incorporated Under The Laws of New York.

Capital paid in.....$2,700,000.

Buyers of All Classes of

GOLD, SILVER, LEAD AND COPPER ORES,

Bullion, Mattes and Furnace Products,

GOLD BARS, SILVER BARS and MILL PRODUCTS.

SMELTING WORKS:
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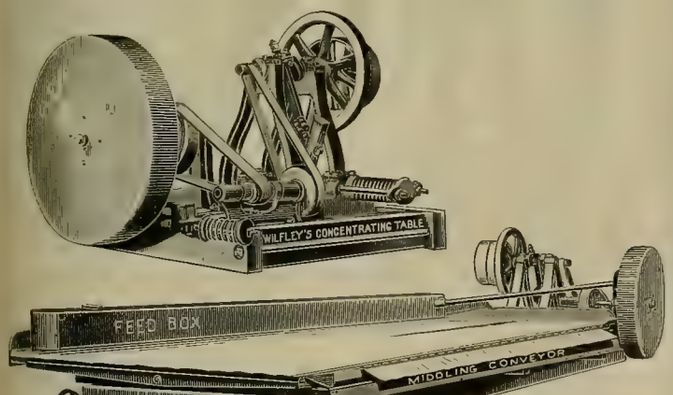
We use the following Cipher Codes at our Argentine Works: A. B. C. Code; Moreing & Neal's Code and Bedford McNeill's Code.



WORKS OF THE CON. KANSAS CITY SMELTING AND REFINING CO. AT LEADVILLE, COLO.

AGENCIES:
In United States—
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J. H. Weddle, Leadville, Colo.
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The Mine and Smelter Supply Co.,

. . . DENVER, COLORADO, . . .

ARE SOLE AGENTS FOR THE

Wilfley Concentrating Table,

And claim for it BETTER work than any Concentrator made, with a capacity of from 15 to 25 tons per day of 24 hours. It is simplicity itself. No moving belts or intricate parts. Anyone can learn to operate in an hour.

For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Col.; M. E. Smith Concentrator, Golden, Col.; Mary Murphy Mine, St. Elmo, Col.; W. E. Renshaw, Mayflower Mill, Idaho Springs, Col.; W. H. Bellows, Boyd Mill, Boulder, Col.; H. E. Woods, Denver, Col.

ROMLEY, COLO., Jan. 19, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Answering yours of the 5th inst., would state that after a thorough trial we have discarded seven Woodbury Tables and two Johnsons and adopted the Wilfley Concentrating Table, which we think up to date is the best table in the market, so far as our knowledge is concerned. Yours very truly, [SIGNED] B. B. MORLEY, M'g'r Golf M. & M. Co.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

PRICE, $450.00.

IF YOU HAVE A SMELTER--YOU WANT IT.
IF YOU HAVE A COPPER MINE--YOU NEED IT.
IF YOU HAVE A CYANIDE PLANT--YOU OUGHT TO HAVE IT.
IF YOU OWN CHLORINATION WORKS--YOU SHOULD BUY IT.
IF YOU ARE INTERESTED IN A MINE OR MILL--YOU CAN'T DO WITHOUT IT.

What? P. & B. Paint.

IT IS ABSOLUTELY ACID PROOF---TRIED AND PROVEN.

Manufactured by

PARAFFINE PAINT CO., San Francisco. Los Angeles.

You Can Order It From Your Dealer.

DEWEY & CO., Patent Solicitors, 220 Market St., San Francisco.

TUTTHILL WATER WHEEL.

The Latest and Best Jet Wheel in the Market, BARRING NONE.

Wheels, Buckets and Nozzles Designed to Suit Special Requirements. When Head and Conditions Are Given.
Theoretically as Well as Practically Perfect. Highest Efficiency Guaranteed.

CONTRACTS TAKEN FOR ANY SIZE PLANT.

We have a Sensitive, Simple and Durable Governor, entirely new and novel, that will positively regulate speed of wheel. Specially adapted for electric railway and lighting plants.

Write for Catalogue.

OAKLAND IRON WORKS, Builders.

108 FIRST STREET, SAN FRANCISCO. Telephone 1007 Main.

NOTICE TO ORE SHIPPERS.

By shipping your ores to us you can obtain the highest prices paid on competitive bids in the public market, together with a careful and accurate sample, as with our new mill and improved machinery we are able to give perfect satisfaction to all shippers. *Write for our Pocket Reference Book.* The highest cash price paid for gold bullion and old gold. Prompt returns.

STATE ORE SAMPLING COMPANY, Denver, Colo.

Market Reports.

The Markets.

SAN FRANCISCO, April 8, 1897.

Jobbers report a steadily enlarging demand for all lines of goods with prices, as a rule, stiffening. Tariff legislation continues a disturbing factor, and until the bill has been further advanced in the Senate, dealers will be slow in banking on the high rates of duty the House bill calls for. When buying beyond nearby wants they do not take goods that have been advanced to about full figures with the proposed tariff added. This course is dictated by authentic information that the Senate will prune the bill very materially, and also that it will not accept the retroactive part. It is thought that the latter was adopted by the House so as to keep importers from shipping very large quantities of goods into this country. Crop advices continue of the most favorable character, but the season is backward, which endangers grain in sections subject to north winds. With the fruit and grain crops assured, business with the agricultural sections will be pushed by jobbers. Foundrymen and manufacturers report continued free inquiry for bids on new work. Many of them have considerable work on hand.

The local money market is practically unchanged. The banks report a liberal supply of funds on hand, with a light demand ruling. Idle money continues to come out for investment, but it meets with a slow demand. The belief prevails that within the next sixty days this demand will begin to increase for crop purposes. It is believed, also, that when tariff legislation is further advanced there will set in more activity in speculative channels, which will call for money. Merchants report fair to good remittances for the season of the year. New York advices are to the effect that money is still in large oversupply, causing low rates of discount to rule, notwithstanding an improved call from importers, woolen manufacturers and wool speculators. The supply of sterling bills on which loans have been made has been reduced to about $10,000,000. Money in England continues in oversupply. In the open London market the rate is as low as 1¼ per cent a year for call on gilt-edge security. Russia and Japan continue to buy gold, which keeps the premium strong.

New York Silver Prices.

NEW YORK, April 8. — Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	28 7-16	62
Saturday	28⅜	61⅞
Monday	28⅜	61¾
Tuesday	28 5-16	61 11-16
Wednesday	28⅜	61¾
Thursday	28 7-16	62

	Copper.	Lead.	Iron.	Tin.
Friday	10 70@10 75	3 37½	10 00@12 50	13 17½
Saturday	11 70@11 75	3 40	10 00@12 50	13 17½
Monday	11 70@11 75	3 40	10 00@12 50	13 20
Tuesday	11 65@11 75	3 40	10 00@12 50	13 20
Wednesday	11 65@11 75	3 40	10 00@12 50	13 30
Thursday	11 70@11 75	3 40	10 00@12 50	13 35

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	15c Prem
New York Telegraphic Transfer	17½c Prem
London Bankers' 60 days	$4.84¼
London Merchants	$4.85
London Sight Bankers	$4.88¾
Refined Silver, per oz., 1000 fine	62¼
Mexican Dollars	49@50

SILVER.—The market went off about ⅜ cent from last week's closing, but to-day it seems to be steadier. New York advices state that at the lower prices there has been very heavy shipments from that city to Europe. The fear still exists that Japan may yet authorize the sale of her bullion, and until this assumes a stronger negative form the market is expected to rule at low prices. Our New York advices report: "In India the stringency in the money market continues. Indeed, the expenditure upon famine relief is so great, and is likely to continue so long, that more or less of stringency may be expected for some months. At the same time the India Council is not selling very freely. The belief is that the drain upon the Government treasuries consequent upon the relief works is so great that the Council is not in a position to sell very freely."

MEXICAN DOLLARS.—The market is quiet at the low quoted prices. The uncertainty as to the course of silver causes Chinese shippers to confine their buying to actual wants.

QUICKSILVER.—Our market is reported the same as last week. The East reports a firmer market at New York, and also London. There has been a steady cleaning up of outside holdings, with a good consumptive call ruling.

Our market is quoted at $40 for domestic consumption.

COPPER.—Prices have continued to shade off in this country and also in Europe. There seems to be an entire absence of any speculative movement, which precludes the possibility of an upmove when the production is steadily increasing. The consumption in America and Europe is fully as large as it was at any time in 1896. In our market 14½ cents is an outside figure for ingots in jobbing lots.

The local market is quoted as follows:

Ingot, jobbing	—@14½
Ingot, wholesale	—@13½
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17

TIN.—The market at the East, after selling lower, has strengthened, closing strong today. The demand at the East and on this coast for tin plate is quite active, but, owing to selling competition, American plate is hard to quote correctly.

We quote as follows in a jobbing way:

Pig, per lb	14¼c@ —
Plate, I C coke, heavy, per box	$4 05@ 4 15
" " " light, "	3 95@ —

BORAX.—The outward movement by rail and water to the East is large.

The market is quoted as follows:

Refined, in car lots	4¾
Refined, in sacks	5
Powdered, in car lots	5
Concentrated, "	4½

POWDER—The market is steady.

The market is quoted as follows for Hercules: No. 1, from 11½c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

LEAD.—There is nothing new to report in our market. Prices shaded off at the East, but toward the close it recovered under an improved demand.

Our market is quoted in jobbing lots as follows:

Pig	4 00 @ 4 25
Bar	— @ 4 50
Sheet	5 62½@ 6 12½
Pipe	4 87½@ 5 37½

SHOT.—The market is steady with only a fair jobbing demand reported.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

IRON.—There is nothing new to report in the market either here or at the East. The consumption is very heavy in this country, stimulated by low prices. Notwithstanding this, the exports to Europe are increasing. This shows very large production.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—The market is essentially unchanged. The imports are less, as is the quantity on passage. This makes a firm market for spot and near-by. Distant cargoes are easier, owing to prospects of a large wheat crop in this State.

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

ANTIMONY.—The market is steady.

Our market is quoted at 7½@8½c in a jobbing way. New York mail advices quote 7½c for Cookson's, 7@7½c for Hallett's and 7c for Japanese.

NAILS.—The market is steady to firm.

Wire, carloads, basis per keg			
" jobbing, " "			$2 25
Cut, carloads, " "			
" jobbing, " "			2 10

SPELTER.—The market is steadier.

We quote our market in a jobbing way at 5 cents a pound.

NICKEL ANODES.—The markets here and at the East are firmer.

PLATINUM.—Dealers report a slow inquiry.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC.—The market is steady at quotations.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is firm.

We quote in jobbing lots at 50 cents per pound for ingots.

BISMUTH.—There is nothing new to report.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is slightly steadier.

We quote in a jobbing way at 70 to 75 cents per pound.

Chemicals.

The market is firming up at the East in anticipation of tariff legislation. While our market is not quoted higher, yet it is quite firm with a tendency to advance prices.

BONEASH.—The market is unchanged.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is more active, but steady at 2½c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is quiet but steady at $1.70 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a better demand at 2½c a pound from stores.

NITRATE OF SODA.—Advices from the East report an improving demand at firmer prices.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported steady from store at 6½c per pound in carboys.

SULPHURIC ACID.—The demand is fair. We quote in a jobbing way at 1½c per lb for 66%.

BLUE VITRIOL.—Our market is more active.

We quote in a jobbing way at 4½c per pound.

$32,915,000
Paid in Dividends by Utah Mining Stocks.

Weekly Market Letter on Application.
Quotations by Wire or Mail.

JAMES A. POLLOCK, Mining Stock Broker,
SALT LAKE CITY, UTAH.

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.	Secretary.
Alpha Con M & M Co, Nev	18	5c	Mar 2	Apr 5..Apr 27	C E Elliott, 309 Montgomery
Belcher S M Co, Nev	54	25c	Mar 2	Apr 6..Apr 27	C L Perkins, Mills Bldg
Brunswick Con G M Co, Cal	11	3c	Mar 22	Apr 23..May 15	J Stadfeld
Channel Bend M Co, Cal	7	2c	Mar 22	Apr 24..May 17	J P Langhorne, 39 Sutter
Con Cal & Va M Co, Nev	8	25c	Mar 8	Apr 13..May 3	A W Havens, 309 Montgomery
Confidence S M Co, Nev	28	30c	Mar 13	Apr 16..May 7	A S Groth, 414 California
Con Imp M Co, Nev	38	1c	Feb 16	Mar 23..Apr 13	C L McCoy, Mills Bldg
Crown Point G & S M Co, Nev	70	20c	Mar 24	Apr 28..May 19	James Newlands, Mills Building
East Best & Belcher, Nev	5	15c	Mar 25	Apr 26..May 13	E W Sichel, 337 Pine
Eureka Con D M Co, Cal	8	5c	Apr 2	May 15..June 5	D M Kent, 330 Pine
Golden State M Co, Idaho	1	1½c	Mar 29	May 1..May 17	E Logan, 101 Van Ness
Gray Eagle M Co, Cal	46	5c	Mar 30	May 8..May 29	W J Gurnett, 308 Pine
Hale & Norcross S M Co, Nev	111	10c	Mar 20	Apr 23..May 14	R R Grayson, 331 Pine
Horseshoe Bar Con M Co, Cal	7	10c	Mar 8	Apr 17..May 8	D M Kent, 330 Pine
Jamison M Co	9	5c	Nov 27	Apr 24..June 19	Sam W Cheyney, 120 Sutter
Mexican G & S M Co, Nev	56	20c	Mar 3	Apr 7..Apr 29	C E Elliott, 309 Montgomery
Mineral Hill M & S Co, Cal	1	5c	Jan 4	Feb 15..Apr 13	Chas Peach, 210 Sansome
Potosi M Co, Nev	47	20c	Mar 10	Apr 14..May 5	C E Elliott, 309 Montgomery
Seg Belcher & Mides Con M Co, Nev	19	5c	Apr 6	May 10..May 29	E B Holmes, 309 Montgomery
Sierra Nevada S M Co, Nev	112	25c	Mar 2	Apr 6..Apr 26	E L Parker, 309 Montgomery
Sulphur Bank Q M Co, Cal	5	25c	Mar 23	May 3..June 3	T Wintringham, 306 California
Tenabo M & M Co., Nev	1	50c	Mar 29	May 4..May 24	T J Read, 606 Sutter
Union Con M Co, Cal	1	10c	Mar 18	Apr 22..May 10	J M Fletcher, 320 Sansome
Union Con S M Co, Nev	54	20c	Apr 7	May 11..June 1	A P Swain, 309 Montgomery

Mining Share Market.

SAN FRANCISCO, April 8, 1897.

The activity reported last week has continued since. There was an advance under the lead of Con. Virginia up to Wednesday morning, when the shares sold at $1.65, Ophir at $1.15 Chollar at $1.25, and the rest of the list in proportion. It is said that the advance was due first to outside buying on bull points while the higher prices for Con. Virginia and Ophir caused quite a number of shorts to fill. The latter were chiefly small short sellers who fly to cover at any moves indicating much of an advance. It is said that there are some shorts out on Con. Virginia and shares in two or three other mines but it will require more than a 50 per cent or even 100 per cent raise to make them fill. Some day they may be compelled to fill at a heavy loss for the chances for finding a big body of good to high grade ore in one or more of the mines are not exhausted by any means. While the unexpected is liable to occur, as it has several times in the past, yet the work that is being prosecuted does not point to favorable results in the near future, but it does indicate more assessments. A report came to hand from Virginia City that in Best & Belcher shaft No. 2, Brunswick lode, they have struck ore. Whether the report is correct or not the writer has no way of verifying but experienced miners have held to the opinion that when desired more ore and higher grades could be found north of Savage than has been found south of that mine. It is the belief among miners that sometime the Brunswick lode would be worked so as to make it possible for mines located on it to pay dividends. At this writing it looks as if that time is in the dim future, possibly after the old and rich men belonging to the inside pool are gone to their last resting place and younger men in charge.

Only $206,898 assessments levied on shares of mines located in Nevada fall delinquent in this month. More assessments will fall delinquent next month, the month afterward, so on ab libitum. These assessments are a rich lead for some persons, but it is safe to say not for those on the outside so unfortunate as to own shares. Some of the companies collect assessments and have not had even one miner at work for months before levying it, while others have two at work and from six to ten supernumeraries. On the pay roll there are several companies that have quite a number of miners at work but they are worked in such a way as not to strike ore of much value or size.

From the Comstock mines the news continues unimportant—too many shares out and the business and financial conditions of the country not as yet justifying an attempt to make a big deal. In Utah they are still running east from the old south drift. No change in material is reported. At last the Superintendent of Sierra Nevada has made a strike, which must afford some satisfaction to shareholders, even if it is water, which has been struck in the west crossdrift on the Layton tunnel level. In Union they are exploiting the 900-foot level in almost every direction except that which would lead to a strike of ore. The west crossdrift on the 1000-foot level in Mexican has been stopped after being driven ahead nearly 400 feet. The writer stated some time ago this would be done when within a short distance of ore. But this assertion can be made regarding the work in any of the mines. In Ophir they are still drifting west on the 1000-foot level. This ought to be stopped before long or else they will strike ore. In Con Virginia they are still "pegging away" on the 1000-foot, 1550-foot, 1650-foot and 1750-foot levels. The work on these levels is of the same character reported by us for two weeks past. Unless more ore is taken out in the near future than for several weeks past another assessment will have to follow the one now on. They are making slow progress very fast in the Best & Belcher and Gould & Curry joint east crossdrift. Fully 6 feet was run last week. Nothing was struck outside of porphyry. In Savage nothing new is reported by the Superintendent. The official letter from Hale & Norcross reports that they are driving ahead on a west crossdrift from a raise above the 900-foot level. The company sold 32 tons of ore at $15 a ton and 15 tons of old fillings at $1.50 a ton. No work is being done in Chollar. In Potosi they are exploiting the upper levels. Miners say that if the work is in the right direction good results are sure to follow. They are slowly extending the north drift in Bullion. They are still at work on the 500-foot level of Alpha. The management is more desirous of getting shares than ever. Slow progress is being made in the west crossdrift that is being run by Challenge, Con. Imperial and Confidence. Confidence reports extracting a few tons of ore. From Crown Point, Belcher, Seg. Belcher, Overman and Caledonia nothing new is reported in last letters received. In Alta they have run an east drift into East Alta ground. They cut a stringer of fair grade ore.

From the Brunswick lode official letters are unimportant, but private advices state that in shaft No. 2, Best & Belcher, they have struck ore. This is quite important. In Chollar they have commenced work to open up the 600-foot level. A crossdrift is expected to be started soon from the south drift on the 500-foot level. They have resumed extraction

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of ore. Bullion shipped to mint aggregates $10,483, of which $3321 is gold. In Occidental the work is practically unchanged, being continued on the 550-foot and 850-foot levels. The formation is about the same as reported last week. In Savage, Gould & Curry and Best & Belcher official advices do not report any change from last week's advices.

The following illustrates the changes of the week:

MINES.	Apr. 1.	Apr. 8
Alpha		$ 10
Alta Consolidated	$ 01	08
Andes		22
Belcher	14	37
Best & Belcher	64	66
Bodie		
Bullion		10
Challenge	38	36
Chollar	1 15	1 15
Confidence		81
Consolidated California and Virginia	1 20	1 60
Consolidated New York		
Crown Point	18	16
Exchequer		
Gould & Curry	29	35
Hale & Norcross	88	88
Justice		
Mexican	23	16
Ophir	91	1 00
Overman		
Potosi	31	33
Savage	26	
Sierra Nevada	22	17
Union		26
Utah		
Yellow Jacket	27	28

San Francisco Stock Board Sales.

SAN FRANCISCO, April 8, 1897.

9:30 A. M. SESSION.

300 Alta 08
300 Gould & Curry 34
50 Belcher 37
100 H. & N. 88
1100 Best & Belcher .. 66
200 Keutuck 06
100 Caledonia 12
100 Mexican 45
200 Challenge 36
200 Ophir 1 00
100 Chollar 1 15
200 Potosi 33
700 Con Cal & Va 1 60
100 Sierra Nevada 16

SECOND SESSION—2:30 P. M.

200 Mexican 46
100 Belcher 37
300 Gould & Curry 35
100 Confidence 84
300 Con Cal & Va 1 60
50 Sierra Nevada 17
100 Best & Belcher 64
200 Bullion 10
300 Potosi 33
200 Union 26
100 Crown Point 16
200 Alta 07
100 Yellow Jacket 28
100 Andes 22
100 Alpha 10
100 Ophir 1 00

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by the hydraulic process from T. C. Cox and W. C. Pidge, in the Philadelphia mines, near Columbia, Tuolumne Co., to deposit tailings in Rose and Eagle creeks, and from F. G. Curnow and others, in the Little Grass Valley Mine, near Columbia Hill, Nevada Co., to deposit tailings in an old reservoir, gives notice that a meeting will be held at room 59, Flood Building, San Francisco, Cal. on April 19, 1897, at 1:30 P. M.

STOCKHOLDERS' MEETING. Notice of Stockholders' Meeting of the Steeple Rock Development Company: In accordance with a resolution passed by the Board of Directors of the Steeple Rock Development Company, a meeting of the stockholders of this company will be held at 3 o'clock in the afternoon on TUESDAY, the 11th day of May, 1897, at its principal office, No. 320 Sansome street, room 24, San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Million Dollars, in four hundred thousand shares, at the par value of five dollars each.

H. PICHOIR, Secretary.

Dated at San Francisco, Cal., March 26, 1897.

STOCKHOLDERS' MEETING.—Notice of Stockholders' Meeting of the Alaska Juneau Gold Mining Company. In accordance with a resolution passed by the Board of Directors of the Alaska Juneau Gold Mining Company, a meeting of the stockholders of the company will be held at 2 o'clock in the afternoon on WEDNESDAY, the 21st day of April, 1897, at its principal office, room 23, 320 Sansome street, San Francisco, to consider and vote upon a proposition to increase the capital stock of this company to Five Million Dollars, in five hundred thousand shares at the par value of ten dollars each.

R. M. MEIN, Secretary.

Dated San Francisco, Cal., March 13, 1897.

NOTICE TO CONTRACTORS.

The Monterey Power Company invites bids for putting in its entire plant, dam, flume, wheels, electrical apparatus and pole line from Little River (22 miles south of Monterey City) to Monterey and Salinas City, for the generation and transmission of electrical current of not less than 450-horse power; entire distance being approximately 37 miles.

Bids will be received up to SATURDAY, April 17, 1897, at 2 o'clock P. M., at the company's offices, Monterey City, Monterey County, Cal., where plans and specifications may be seen.

All bids must be accompanied by a certified check for ten per cent of the sum of such bid. Checks to be payable to the company and to be held upon the usual conditions.

By order of the Board of Directors.

F. A. BOTSCH, Secretary.

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Assessment Notices.

CONSOLIDATED CALIFORNIA AND VIRGINIA Mining Company. Location of principal place of business, San Francisco, California. Location of works, Virginia Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the 8th day of March, 1897, an assessment (No. 81) of 25 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room 45, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 14th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 3d day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. W. HAVENS, Secretary.

Office—Room No. 45, Nevada block, No. 309 Montgomery street, San Francisco, California.

HALE & NORCROSS SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of March, 1897, an assessment (No. 111) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 11, 331 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of April, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 14th day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. R. GRAYSON, Secretary.

Office—Room 11, 331 Pine street, San Francisco, California.

SEG. BELCHER AND MIDES CONSOLIDATED Mining Company.—Location of principal place of business, San Francisco, California; location of works, Gold Hill Mining District, County of Storey, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 6th day of April, 1897, an assessment (No. 19) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, No. 309 Montgomery street, Room 50, Nevada block, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1897, will be delinquent, and advertised for sale at public auction, and, unless payment is made before, will be sold on SATURDAY, the 29th day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. B. HOLMES, Secretary.

Office—No. 309 Montgomery street, Room 50, Nevada block, San Francisco, California.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9), of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 26th day of March, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on SATURDAY, the 24th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 19th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

OFFICE OF THE HALE & NORCROSS SILVER Mining Company, Room No. 11, San Francisco Stock and Exchange Building, No. 331 Pine street, San Francisco.

To the stockholders of the Hale & Norcross Silver Mining Company and to all others concerned:

Notice is hereby given that, pursuant to the consent, in writing, of the holders of two-thirds of the capital stock of the Hale & Norcross Silver Mining Company, duly filed in the office of said company, the principal place of business of said Hale & Norcross Silver Mining Company has been changed from Room No. 3 of the San Francisco Stock and Exchange building, No. 331 Pine street, in the City and County of San Francisco, State of California, to Room No. 1 in the same building, where the business of said Company will be hereafter transacted. This notice is published in accordance with Section 321 of the Civil Code.

Dated March 19, 1897.

By order of the Board of Directors.

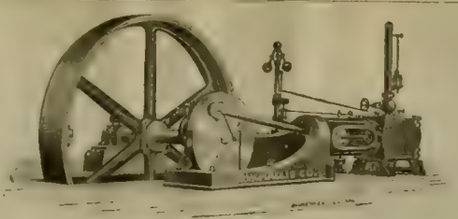
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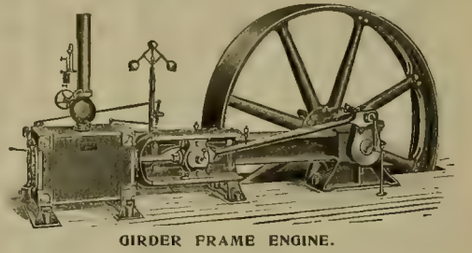
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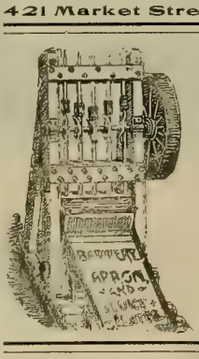
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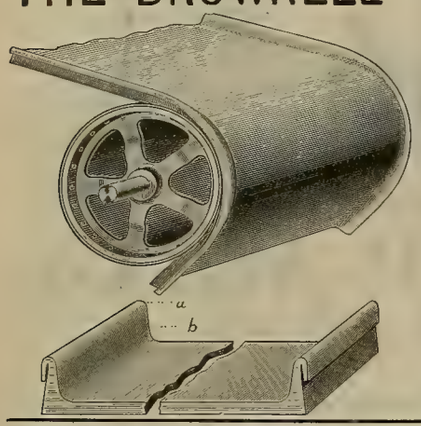
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RAWHIDE GOLD MINING COMPANY.
JAMESTOWN, TUOLUMNE CO., CAL., Feb. 21, 1897.

J. S. BROWNELL, ESQ.—DEAR SIR: Replying to your query of Feb. 15th, will say that I have used your Patent Lip flange belt more than one year, and judging from their appearance after more than one year of hard service, I do not hesitate to say that they are the best belt I have ever used and I take great pleasure in testifying to the fact. Yours truly, W. A. NEVILLS, President.

AMADOR CITY, CAL., Feb. 18, 1897.

MR. J. S. BROWNELL—DEAR SIR: I take pleasure in saying that I have used your Patent Lipped flange belt for several years while connected with this company, and I consider them the best that we have used. The quality of rubber in the flange seems to be the best, and we are not bothered with the flange cracking and thereby destroying the life of the belt. At present we are using 14 concentrators, and have in use several kinds of belts. We consider your Patent Lipped flange the best. Yours very truly, THE CONS. SOUTH SPRING HILL G. M. CO.
By JOHN R. TREGLOAN, Superintendent.

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JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.
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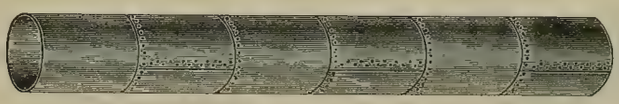
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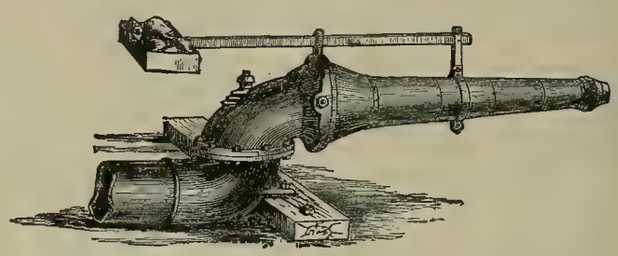
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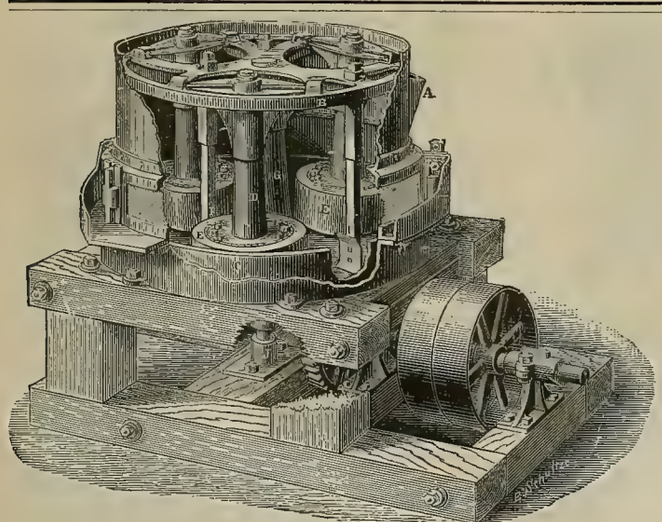
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The Huntington Mill is so well and favorably known among mining men throughout the world that any description of it would seem superfluous. They are in use in the United States, Canada, Mexico, Central and South America, Australia, China, Japan and South Africa—in fact, wherever mines exist, and have given the best satisfaction of all quartz-crushing mills. The construction of this Mill has lately been much improved and we claim it to be the cheapest, most efficient, simplest and most durable Mill upon the market. Catalogue upon application.

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No. 1919.—VOLUME LXXIV. Number 16. SAN FRANCISCO, SATURDAY, APRIL 17, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

California Petroleum.

Probably no other mining industry in California enjoyed last year a greater increase of prosperity than that of petroleum. Although complete returns have not been received, Statistician Yale states that while the yield of 1896 in barrels will be shown to have been but slightly more than that of 1895 the value has been far greater, owing to better prices having been obtained. There were produced, in 1895, 1,245,339 barrels, valued at $1,000,235. Far better prices were obtained in 1896 than in 1895 owing to an increased local consumption, better means of storing and an increase in the amount shipped to this city and other distant points.

The great question now before the oil producers is how to obtain a wider market for their product, and especially to arrange for shipping facilities to the city of San Francisco. The larger concerns can and do ship, and, as a consequence, they obtain far better prices for their oil than do the smaller producers. The fact that the prices in 1896 went up to nearly double those of 1895, without a large widening of the field to be supplied, speaks very well for the future outlook of the oil industry in California.



OIL WELLS IN LOS ANGELES CITY.

In 1893 the yield of petroleum amounted to 470,179 barrels, valued at $608,092; in 1894 it was 783,078 barrels, valued at $1,064,521, and in 1895, as stated, 1,245,339 barrels, valued at $1,000,235.

Los Angeles leads all other counties in the product, and the output for 1896 was probably a little short of that for 1895, which amounted to 979,695 barrels, valued at $732,817. In Ventura county, the second largest producer, the yield was slightly increased over that of 1895, when it was 244,000 barrels. In Santa Barbara many new wells have been bored, and the yield, which was about 16,000 barrels in 1895, was more than doubled in 1896. Small quantities come from Fresno, Kern and Santa Cruz counties. There has been considerable prospecting in other counties from San Diego as far north as San Francisco. The State Mineralogist announces that he will have as soon as possible a map prepared of all the district, from San Francisco south along the coast, showing the location of known oil districts, and will have the field work continued until all the ground has been thoroughly covered by his deputies.

Bulletin No. 11 on "The Oil and Gas Yielding Formations of Los Angeles, Ventura and Santa Barbara Counties," by W. L. Watts, issued last week by the State Mining Bureau, covers the territory in these three counties in which oil wells have been bored very well, and the work will be of great value in those districts. Mr. Watts is now at the Puente wells and H. W. Fairbanks is in San Luis Obispo looking over the geological formations, especially with regard to the indications of the presence of oil. This work will doubtless be continued by the Bureau and will be of great value to those who desire to prospect for oil, and will in many cases save unnecessary expenditure of money. The cost of prospecting for oil is heavy, and the geological work done by the Bureau will consequently be of much value. Mr. Cooper is himself writing another bulletin to be published soon on the oil industry.

In discussing the use of oil for fuel, Mr. Watts states that on the locomotives of the Santa Fe, between Barstow and San Diego, an average of results on a freight engine show that four barrels of oil did the same work as 2200 pounds of Nanaimo coal. Taking coal at $6.65 per 2000 pounds, and oil at $1.33 per barrel, which is near the highest prices reached, a money saving of 27.1 per cent is effected. Other cases are given where a saving of over 50 per cent was effected on overland passenger trains by the use of oil, instead of coal, even when the price of oil was over $6 per 2000 pounds.

Frederick Salathe, Ph. D., contributes in Bulletin 11 a paper giving a resume of original researches, analyses and refining methods of petroleum, in which he has the following to say as to its origin:

The opinions on the origin of petroleum still differ widely among chemists, but through the classic researches recently made by Engler, who has produced the complete series of paraffins, identical with the petroleum-hydrocarbons, by synthesis from fish oils under pressure during distillation, the theory of animal origin of petroleum has become most plausible.

The question has been asked: What has become of the nitrogen, if petroleum was formed of marine animals, and why are most of the petroleum-hydrocarbons free from nitrogen combinations?

Analysis of some natural gas from a well in Pennsylvania shows the presence of nitrogen in natural gas, which in one instance amounted to 23 per cent by volume.

In 1892 I began an investigation on the hydrocarbon series constituting the Ventura county crude oils, which I found to contain invariably from 0.75 to 3.5 per cent of nitrogen. The experiment was conducted in such a manner as to ascertain in what form or combination the nitrogen existed in the crude petroleum, with the view of isolating the nitrogenous hydrocarbons.

The result was the identification of a number of organic bases of the Pyridin and Chinolin series, which heretofore were found only in the so-called animal tar from the distillation of animal cadavers or bones.

The presence of these organic bases in the California petroleum indicates, therefore, clearly the origin of this petroleum from animal matter furnished by the slow decay of a marine fauna, which became extinct by changes of the sea water through local influx of saline mother liquors.

As to the refining, Mr. Salathe gives the following conclusions:

From the investigations given so far, it is evident that the refining of the crude California oils is not an easy task and that they require refining methods different from those practiced with Eastern or Russian oils.

The complicated nature of this class of asphaltic crude oils necessitates complete elimination of all unstable hydrocarbons by inexpensive practical processes. Another great difference exists between the specific gravities of Eastern oil distillates and those of California oils. Viscosity of distillate or reduced stock being equal, the gravities are from 5° to 6° B. lower in California oil fractions than in those of Eastern oils. Flash and fire tests are from 10° to 30° F. lower in California oil distillates than in Eastern distillates of the same gravity.

The accompanying illustration, from the State Mineralogist's report, shows the forest of rigs in the oil section of the city of Los Angeles.

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San Francisco, April 17, 1897.

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Mr. Evans' Article.

In the issue of the 10th inst. was begun an article entitled "Practical Notes on Hydraulic Mining," by George H. Evans of Oroville, general manager of a number of mines in Butte county owned by English capitalists. Mr. Evans, while a skilled engineer, appreciates the need that the large majority of miners have for rules for calculating as to water ditches, pipes, etc., that are not too technical and may be used by any one familiar with the common rules of arithmetic. In this work he is making available to many the best results of the work of hydraulic engineers. Besides this, much of the data given, gathered from practical experience, will be found of as much value to the mining engineer as to the miner.

University Extension and Mining.

When Levi Strauss of San Francisco last month established twenty-eight scholarships in the State University the Governor addressed him a letter of thanks, in which he took occasion to say: "I have long contemplated a change in the local character of the normal schools of the State, so that they might subserve the purposes and, in fact, constitute branches of our State University, so that students could practically attend the State University for, perhaps, the first two years near their own homes and there receive absolutely similar instruction to that at the parent institution and by the same professors."

In this column some time ago it was suggested that the faculty of the School of Mines at the State University devise some scheme by which young men in the mining districts would be enabled to do part of the work required of candidates for the degree of mining engineer at their homes. The establishment of local schools of mines would, of course, be out of the question; but there young men could be given directions for the study of geology, mineralogy and, in many cases, chemistry in the mines. A little practical work done in any of these sciences would enable those who propose to enter the School of Mines at Berkeley to obtain degrees in much less than the time usually required. There is no reason why each mining town of any consequence in this State should not have a good working collection of minerals. This, and university extension lectures by the professors from Berkeley, would make a beginning. There are many good purposes that the mineral collections from the mines of any county would subserve besides that of education, and there should be no difficulty found in forming them.

The Prospector.

Now comes the season when the nomadic prospector will be heard from in the north. During the past winter he has done good work in Arizona, New Mexico and in southern California, and as a result there have been more reports of the discovery of valuable mines and the opening up of new districts in that part of the country during the past three or four months than there has been for several years before. What is best about it all is the fact that capitalists or representatives of capital have paid attention to these reports and followed them up, and as a result a great deal of development work is being done and the prospector's labors will not go in vain so much as they have in the past decade and a half, during which the mining industry has been in the dumps and men of means have sought other sources for investment. For many years back the prospector's reports have not been noticed—even when he has made valuable discoveries. He has been neglected, looked upon as about "played out" and treated with scant courtesy by capital. Now this is all changed. Capital keeps an eye on the prospector and is very glad to give heed to him.

It is not uncommon nowadays for men of means, interested in mines, to engage on a salary skilled prospectors to go out and look for mines. In all cases, in addition to the pay, which is generally small—a little more than enough to cover expenses—there is the promise of an interest in any discoveries made. This is of course an outgrowth of the old system of "grub-staking," which, too, is still in vogue. Many of these prospectors so sent out are men of considerable education, with a good knowledge of mining geology and assaying.

Like the men of wealth and leisure, or like the birds, the independent prospector, in a measure, has his winter abode and his summer resort. Many of those who have lately been in the more congenial winter climates of the south, are now making their way north. Alaska is fast filling up with prospectors for the season. They will not go to the Yukon placers nor search for labor in the quartz mines already opened; they will go farther afield and prospect for quartz in comparatively unknown districts of the great northern province. Whether there shall be much greater interest taken in the Alaska quartz mines later in the season or next year, will depend largely upon what account is rendered by the prospectors.

In Rossland, Trail and other towns of British Columbia, in the Kootenay district, a few days ago, were hundreds of prospectors camping on the rear of winter. Now the snows are melting and they are making their way north, and, in many cases, far beyond where any mining has heretofore been done. There are few better fields, too, for an immense country, virgin to the prospector, lies ready for his wooing. So, too, in Idaho, Washington, Montana, Wyoming, South Dakota, and in the higher altitudes of Utah, Nevada and Colorado, as the snows melt, the prospectors are making their way for their summer outings. Reports of the discoveries of new mines and new mining districts may be expected for the next six months from the north, rather than from the south.

Nevada's New Mining Law.

The State of Nevada has just adopted a law relating to the location of mining claims, mill sites and tunnel rights, which is an exact copy, with the exception of one sentence, of the bill prepared for the MINING AND SCIENTIFIC PRESS, and published in the issue of October 31st last for the consideration of the California Miners' Convention and the State Legislature. It has several advantages over the new California act. One of these is in that it specifically defines what number and sizes of posts shall be set up to properly mark the boundaries, and will stop a very fruitful source of litigation. As to the amount of work to be done to hold a location, the bill provides that, within ninety days after the posting of the notice, the locator must sink a discovery shaft to a depth of at least ten feet or run a cut or tunnel equivalent. The act, which is made up mainly from the best practices in other States and Territories, covers the ground very thoroughly and is in accordance with the requirements of practical miners.

The Mint Report.

The annual report of the director of the Mint of the United States for the fiscal year ending June 30, 1896, has been received. Some of the information contained has been given to the public by the director through the press, but much of it that would have been of value and more interest if published before it became ancient history is now given out for the first time. The main value of the publications of the Government is lost in the delay in printing them and giving them out to the public. Until a few years ago the publications of the United States Geological Survey were of little practical value for this reason. Now it is generally acknowledged that a great deal of interest is being taken in the work of the Survey because it is more timely than it was and there is less delay in giving out the results. This report of the director of the Mint is nearly a year behind time and comes after interest in the period covered has considerably died out.

As to gold of domestic production, the deposits during the fiscal year ending June 30, 1896, were valued at $53,910,957.02, while those for the previous year were $44,371,948.83. As practically all the gold produced was sent to the Mint, this gives a pretty accurate idea of the great increase in the yield of that metal. As to silver, the deposits at the Mint tell very little as to the product. The total value of the silver bullion received during the year of domestic production was $5,716,742.64, as compared with $8,804,363.43 for the fiscal year ending June 30, 1895.

The Oregon Mineral Land Bill.

In southern Oregon the miners are beginning to feel the need for the passage of the mineral lands bill, presented in the United States Senate by Senator McBride, providing for the segregation of agricultural and mineral lands under the railroad grants—similar to the mineral land bill proposed for California. The newspapers of southern Oregon are exposing the methods of the railroad, whose representative says that there is a mistaken idea among the people to the effect that the railroad company wants to gobble up the mineral lands. On this subject the Rogue River *Courier* says:

The people residing in the mineral belt of southern Oregon have had these same sentiments preached to them for several years, notwithstanding mineral claimants find they must go to much trouble and expense to defend their claims from the railroad land grant patents. Possibly the fault is with the General Land Office, which by its ruling throws the burden of proof upon the mineral claimant. It is hoped that through the new Commissioner, Mr. Hermann, who should be familiar with the situation, the ruling may be modified to throw the burden of proof upon the company, or otherwise simplify the miner's procedure. There is good ground for maintaining the position that the bulk of the railroad lands claimed in southern Oregon are mineral, and would be found to be so upon examination. But patents have issued for a vast amount of these lands to the railroad already.

The Passing of District Rules and Regulations.

The new mining law of Utah, as to the location of claims upon the public domain of the United States, provides—as does that of California—for the recording of all notices with the county recorder. This more than anything else tends to do away with the necessity for local mining districts. In Utah the principal objection urged against the bill was this clause; but in California less was heard on this point, mainly because in many of the old camps for years there has been no local recorder and in very few has the old district organization been kept up. It would seem as if the day for the district rules and regulations had about passed away. New Mexico, Arizona, California, Utah and other States and Territories have practically all adopted laws that will be found ample for any mining district in any of the States named. However, these laws are not perfect, and new districts in some cases may consider it necessary to supplement them with local rules and regulations. It is to be hoped that they will, especially in California, so that there may be given trial of rules that in time should be incorporated in the law of the State.

Concentrates.

THE shaft of the Geyser mine at Silver Cliff, Colorado, is down 238 feet.

SOME Nevada county, Cal., mines are now using coal from Corral Hollow.

A DISCOVERY of copper-gold ores near tide water has been made on Prince of Wales island, Alaska.

COPPER, not being specially provided for in the Dingley bill, goes into the general 10 per cent ad valorem class.

THE gold yield of Victoria, Australia, for January, 1897, was 52,238 ounces against 50,878 ounces in 1896 and 23,477 in 1895.

ALL steamers going to Alaska are loaded with miners and their outfits, most of them on the way to the Yukon country.

STEPS are being taken by the Mines Department of New South Wales to issue the returns of the yield of gold quarterly.

THE Golden Cycle Mining Company of Cripple Creek has ordered four 150-horse power boilers and a 12-drill air compressor.

SENATOR MCBRIDE has introduced in Congress a bill providing for the examination and classification of mineral lands in Oregon.

THE opal mines in Owyhee county, Idaho, formerly owned by Anchor, Shirley & Co., have been sold to a Philadelphia company.

THE town of Carlin, Nevada, is considerably excited over the discovery of gold-bearing placers near that place, on the Humboldt river.

THE proprietorship of the Broken Hill Proprietary Company is gradually drifting to London. Transfers to the London register are numerous.

THE statement of the condition of the United States Treasury April 9 showed: Available cash balance, $225,410,052; gold reserve, $153,114,438.

AT Nevada City, California, the Champion Mining Company and the Providence people contemplate the erection of chlorination plants at these mines.

ACCORDING to the Gold Creek (Nevada) *News*, from 200 cubic yards of gravel along the bed of Van Duser creek there was cleaned up a few days ago $4916.12.

ARTICLES OF INCORPORATION have been filed in Portland, Oregon, by a company bearing the novel name of the McKinley Gold and Bryan Silver Mining Company.

THE Santa Fe Company has been having some borings made for oil near Fullerton, Orange county, and last week at a depth of 510 feet struck a flow of five barrels per day.

THE hoisting works at the Poorman & Hastings drift gravel mine on Harmony ridge near Nevada City, Cal., was destroyed by fire last Monday. The loss was about $4000.

THE Holliday Coal Company, which is opening up some new coal mines near Price, Utah, have a vein of anthracite 9½ feet deep, from which the first shipment to Salt Lake sold at $7.50.

THE Southern Pacific coal mines at Red Canyon, Utah, produce 500 tons a day, all of which is consumed by the company. The workings in the measure have reached a depth of 1800 feet.

THE Travertine Company at Bridgeport, Cal., has sold three-fourths of its stock to an English syndicate for $125,000. The new owners will erect a better plant for working the stone.

A SMALL herd of cattle was driven into the Yukon country by the Chilcat pass last summer as an experiment; the plan was found to be feasible, and a larger herd will be taken in this summer.

WHAT promises to be of interest to the mining industry is the opening of parts of the Eastern and Southern Ute Indian reservations in northwest Colorado, which will probably be done this summer.

THE London *Economist* of the 10th inst. shows that forty-one Rand, South Africa, mining company stocks on the Stock Exchange have declined from £121,000,000 to £43,000,000 the past eighteen months.

AT the first election in Rossland, B. C., last week, 1067 votes were cast, and Robert Scott, who was chosen Mayor, announced that he would oppose anything savoring of the nature of a "wide open" town.

THE Greek boys' property near Berners Bay, in Alaska, has been placed in Butte, Montana, for $60,000. A tunnel will be run to open up the ledge and a 10-stamp mill erected under the management of E. D. Lutes.

UTAH'S new mining law, passed over the Governor's veto, goes into effect May 10th, after which date all locations must be filed with the County Recorder, and within ninety days $50 worth of work must be done on each claim.

IN the blue clay, at a depth of 30 feet, in the old Hupp & McMurray mine at Weaverville, Trinity county, Cal., lately, about a cord of cedar wood was found. It was not petrified, but charred, and must have been there many ages.

THE oldest tunnel known connected the Pool of Siloam with a spring outside Jerusalem. From an inscription discovered in 1880 it appeared to have begun from both ends. The work dated from the time of Hezekiah, or even of Solomon.

THE Vulture mine at Phœnix, Arizona, formerly owned by ex-Senator Tabor of Colorado, which has produced over a million, has been sold to W. B. Davis of Tucson and H. M. Love of Chicago, who will construct a mill and cyanide plant.

THE output of Cripple Creek has been steadily increased for several months, and so far this year averages, according to conservative estimates, nearly a million. Most of the increase has come from the increased amount of low-grade ores worked.

VIEWED purely as a commercial proposition, the matter of good roads is an important one to California manufacturers of mining machinery. It is to the interest of every man furnishing mine supplies to have improved roads throughout the State.

A LONDON press dispatch states that there are indications that the British are making preparations in many directions for trouble with the Transvaal. During the week two more regiments have been notified to prepare for service in South Africa.

IN the Canadian Parliament a bill has been introduced, and supported by the premier, giving the Government power to place restrictions upon the employment of alien labor, with a view to retaliating against any similar legislation in the United States.

THE European consumption of copper for the first two months of this year has been much larger than for the same period of 1896, and the increase in England, France and Germany is estimated at 8354 tons. The imports of copper into Germany during 1896 were 73,123 tons, against 59,742 in 1895.

A MAIL CARRIER from the Yukon mines in Alaska reports that flour is selling at $1 a pound and ham at $7.50 a pound. He states that many miners are rushing into the country without sufficient provisions. Few of those who go best supplied will have more than enough for their own use.

A GOOD many hard things are at present being said against Gov. Budd for his action in vetoing some appropriations. So far as the miners are concerned he was just and kept his word, acting exactly in accordance with the promise made at the Miners' Convention in this city—after his election.

PEOPLE who lately leased the Ajax dump at Tintic, Utah, are shipping on an average 100 tons a month of ore which was taken from the mine from ten to twenty-five years ago, and which was then considered too low grade to ship. The average value of the ore which they are shipping runs about $30 a ton.

THE Colorado Springs *Mining Investor* complains that the London International Bourse (Ltd.) of London is selling cheap Cripple Creek mining stocks at a price far in advance of what is being offered for them in Colorado. One stock that is sold in Colorado Springs at 5 cents per share is offered at 50 cents in London.

THE Le Roi Mining Company of Rossland, British Columbia, has been considering the advisability of increasing its capital from $2,500,000 to $5,000,000, and at its last meeting decided not to do so. The directors state that offers have been received from English capitalists to purchase the property for $4,000,000.

IT is proposed by the Government of West Australia to establish a Government assay department, metallurgical works and a school of mines, to subsidize smelting works, erect public batteries at various centers, etc. It will not be the fault of the Government if the miner is not contented with his lot.

ELMORE & VAN DUSEN of Green Bay, Wisconsin, have secured options on the Minnesota and National copper mines at Rockland, Ontonagon county, Michigan. These are mass mines and paid nearly $2,000,000 in dividends in the early days of Lake Superior mining. Both have been idle for more than ten years.

IN Nevada City, California, the Providence and Champion mines are reported to be under examination by English syndicates with a view to their purchase. Captain Thomas Mein and Henry Bratnober, representatives of the Exploration Company of London, have been examining the Nevada City and Muller and Walling mines.

THE provincial government of British Columbia has announced its railway policy to be to provide for a loan of $2,500,000, out of which cash subsidies of $4000 a mile are to be given to the railway from Penticton to Boundary Creek, 100 miles; a railway from Butte inlet to Quesnelle, 230 miles, and one from the coast to Chilliwick, 60 miles.

CONSIDERABLE interest is being taken in the attempts to save the fine placer gold along the Saskatchewan river in Canada. Numbers of Americans from Chicago and Nebraska have already commenced work there. There have been several attempts to use machinery for saving this fine gold, but they have proved futile in a large measure.

WITH the opening of spring and summer travel come the usual tremendous tales of rich gold finds, and "the richest gold deposits on earth" is again a familiar head line. An immense amount of prospecting is being done, and doubtless '97 will develop some good properties. Meanwhile the gorgeous imagery of the newspapers is not to be taken too seriously.

THE Arizona *Citizen* says the act passed by the late Legislature entitled to encourage mining and prospecting in Arizona is liable to drive every assayer out of the business. From ten to thirty or more assays are being made daily at the University, while local assayers do not average a half dozen a week. There is neither wisdom nor justice in such legislation.

THERE is in contemplation the sinking of a borehole to a greater depth than has yet been reached in the gold fields of the Rand—some 4000 to 4500 feet. This would be in the dip from the outcrop about 10,000 feet. The Ecksteins and the Consolidated Goldfields will undertake the work at some spot where their interests join, but the exact locality has not been decided yet.

A NEW LAW of Idaho provides that none but citizens or those who have declared their intention to become citizens may be employes in the mines. Manager Huntley last week notified all the aliens at the De Lamar mine to quit or take out their first papers. Most of them declared their intention to become citizens. The constitutionality of the law will be tested in the courts.

THE annual report of the Franklin Mining Company of Michigan shows a production of 2,746,076 pounds of refined copper during 1896. The summary of the year's business gives receipts for the year (including copper unsold estimated at 11¾ cents) of $307,447.99 and total expenditures of $286,789.70, leaving a mining profit for the year of $20,658.29. Net surplus December 31, 1896, stood at $153,487.45.

IN New Zealand satisfactory work in the use of dredgers for mining auriferous gravels has been done. A report just published of the returns of the fifteen companies engaged in this class of mining shows that during 1895 they produced 12,782 ounces valued at £49,535 at a cost of £40,327. Six of the companies worked at a small loss, but several of them were under extraordinary expenses that will not recur.

THE annual report of the Osceola Consolidated Mining Company (copper) of Michigan shows the following figures for 1896: Gross receipts, $687,017.85; total costs, $602,908.74; net income, $84,109.11; dividends paid, $100,000; balance of assets, December 31st, $257,171.76; refined copper output, 6,251,304 pounds; total cost per pound, 9.64 cents. A larger construction account charged to running expenses is the cause of the high cost per pound compared with 1895, when it was 8.75 cents.

IN many of the higher altitudes of the California Sierras during winter the only communication between mines and mining towns and the outer world is upon snowshoes. This is especially true of districts in Siskiyou and Plumas counties. At La Porte, Plumas county, last week there were held some snowshoe races, in one of which 1800 feet was run in 15 seconds. This is at the rate of a mile in 44 seconds, more than twice as fast as the best record for race horses and faster than the time of the fastest express trains. It is said that a hurricane holds the best time record for one mile, covering the distance in 30 seconds. A balloon has done the mile in 40 seconds. The third place is held by the California snowshoers; the fourth by a railroad engine in 53.57 seconds.

THE 30-inch inverted siphon pipe of the Cherokee Company in Butte county, which carries water over the west branch of the Feather river, broke last week, but was repaired in a few days. This pipe was put in in 1870 and carries 2200 inches of water. The head is 150 feet and the greatest depression 887 feet. Although it has been in use a quarter of a century, the men who repaired it last week report that none of the rivets are worn to any appreciable extent; even the coating of tar and asphalt that lined the inside of the pipe remains.

PRESS dispatches from Seattle, Washington, and Washington, D. C., state that the United States Government will probably send a squad of mounted police to the Yukon gold fields in Alaska. On the Canadian side of the line the mounted police of the Dominion Government have done good work, and those in the country with good intentions prefer for that reason to be under the care of the British flag. On the American side there is no law nor government except such as the miners chose to make for themselves.

AT a meeting of the shareholders of the Mountain Copper Company, Limited, owners of the Mountain mines of Shasta county, Cal., held in London on March 25th, the chairman stated that the capital of the undertaking was fully absorbed, and was in the hands of over 100 shareholders. They were already producing copper, and there was every prospect of the company being a success. He said about 1000 tons of copper had been sold since January. It was rather too early to go into the cost of production; but, roughly speaking, he should say there was a good profit upon the work done up to date.

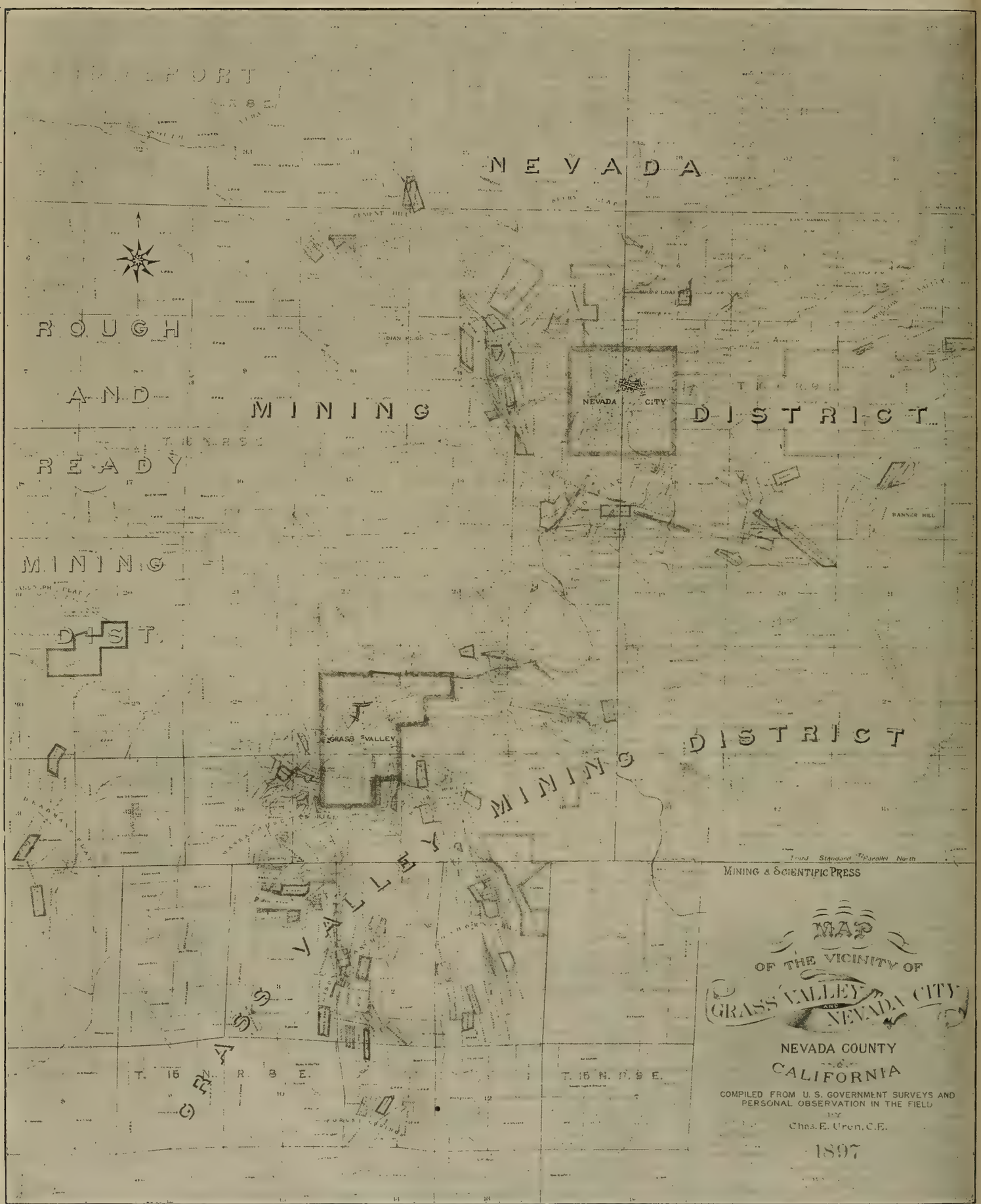
THE report of the Drum Lummond mine in Montana, made to the shareholders in London, for the half year ending December 31 shows that the income amounted to $246,294, and that the total expenses were $213,597. Development work shows that it has been energetically continued during the half year, and as a result 4447 feet of levels, shafts and winzes have been completed at a cost of $66,057. All this work is said not to have opened up any large bodies of ore, but a 2-foot pay streak was undercut in the south drift of shaft No. 2. Better results are expected when the cyanide plant now being built begins to work over the immense quantities of tailings and low-grade ore in the dump.

THE annual output of the Isabella Mining Company of Cripple Creek, Colorado, for 1896, shows receipts from smelting ore of $494,043.20, chlorination ore $63,011.54, bullion $6093.28 and concentrates $4892.63, a total of $568,040.65. The expenses were $347,926.44, of which there was paid for milling $191,121.22, treatment charges $76,138.23, transportation $33,277.12, and lessees $33,448.68. The net profits were $220,114.21, out of which $180,000 was paid in dividends. The total mine expense, including all construction plant and dead work, amounted to $4.36 per mine car of rock, including waste hoisted. The cost per ton for the 8630 tons of pay ore hoisted was $22.15, divided as follows: Improvements, $2 60; surface expense, $3.38; mining ore, $8.87; development, $5.12; general expense, $2.18. Of this, $17.63 was for labor and $4.36 for supplies.

THE variety of "circulating medium" is aptly illustrated by mail receipts in the business office of this paper—national bank notes from east of the Rockies, Bank of England notes from Europe, bills of exchange from South America, big Mexican dollars from Mexico, Wells-Fargo express orders, and United States money orders and gold coin from the Pacific coast. The most unique is the frequent receipt of gold amalgam, and a "gold button," the latter mostly from Nevada, Idaho, Arizona and Montana. Usually with the receipt of a gold button comes a letter stating that no money order or greenbacks can be had, and instructing the office to send such and such books and the MINING AND SCIENTIFIC PRESS. The gold thus sent is usually less than an ounce in weight, varying in value from $14 to $18 to the ounce. Postage stamps are also largely received, some foreign correspondents burdening the office with stamps from their countries, which are not accepted by United States postal authorities, and hence not commercially available.

THE tone of some of the English papers in reference to the Transvaal would indicate that there will be trouble in store for Krueger, whether he wants it or not. The London *Mining World*, in a late issue, says: "The present state of things cannot last. This is felt by the entire white population of South Africa, and, as we have already said, it must be mended or ended. In either case, our advice is to buy Kaffir shares. We believe that any announcement on the part of this country in the way of an ultimatum for the distinct breaches of the London Convention of 1884 that have been made will improve prices. Even if this ultimatum led to war, we still believe that quotations would be improved, because there would be a relief to the intolerable strain that is now felt, and particularly by those of our countrymen and of other nationalities who are now resident within the Transvaal. We hope, however, that this ultimatum will not be presented just yet—that we shall, at least, be allowed to get over the Diamond Jubilee celebrations, and in that time we fancy the Boer Government will have had quite sufficient rope to hang itself."

THE assistant manager of an Alaska transportation and trading company, in a recent interview in a paper in the East, where he has been drumming up business for his concern, gives some very misleading information as to the mines of that country. He says that "the area of this placer mining district extends on both sides of the line a distance of 400 miles long by 100 miles wide, but so far as operations are being carried on over a distance of only 30 miles square. The rest of the country is practically unprospected and, although Indians and stragglers frequently bring in nuggets from unworked territory, no attempt has been made to mine outside of the limited territory referred to, because there are not enough men in the country to extend the operations. The gold is gotten out by panning or sluicing, in a primitive way, the sands on the river banks. To show how rich these sands are, one man recently got $208 in gold from a single pan, and another has a claim which shows through 5 feet of gravel, yielding $3 to every pan. Miners are in great demand, and an ordinary shovel-bearer can get from $10 to $15 a day wages for simply digging sand. He can thus earn $1500 to $2000 during the five months of summer which the land enjoys, and his living expenses will not exceed $500 a year." This sort of talk has led many into Alaska, to meet with privations and hardships.



MAP OF GRASS VALLEY AND NEVADA CITY, CAL.

Grass Valley and Nevada City, Cal.

On this page appears a correct, up-to-date portraiture of the vicinity of Grass Valley and Nevada City, Cal., specially engraved for this paper from a map recently compiled by Chas. E. Uren, C. E., of Grass Valley, Cal. The map is on a scale of 20 chains to 1 inch. In connection with this, Mr. Uren has prepared the following:

Grass Valley Mining District.—This district was finally organized at a convention held at Grass Valley July 27, 1872, immediately after the act of Congress of May 10, 1872, governing the location and extent of quartz mining claims. The first section of the local mining laws, passed at said convention, reading: "Grass Valley mining district shall embrace in its territorial extent the same limits as the township of Grass Valley, as defined by law."

The district, as it now exists, contains about 122 square miles of territory, and joins the Nevada mining district on the south. The city of Grass Valley, the metropolis of Nevada county, is situated in the northern part of the district and contains a population of about 8000.

The discovery of gold in the vicinity of Grass Valley dates back as early as October, 1848, the mining at that time having been confined to shallow placers and creek mining.

The first discovery of gold-bearing quartz in California is credited to this district. This discovery marked a new era of prosperity and the creation of a new system of mining.

The honor of the first quartz mill constructed for the reduction of ore has been divided between the

Gold Hill mine of this district and the old Benton mill on the Merced river, on the Mariposa grant, Mariposa county, owned at that time by General Fremont, "the Pathfinder." While the latter mill still remains in its primitive state—a relic well worth preserving to illustrate the evolution of the quartz mill—Grass Valley has been more fortunate and prosperous.

It has unquestionably been since the early mining history of California the most prominent as a gold-producing district. Not only in all mining communities, but in a great many commercial centers throughout the world, may be found men whose recollections take them back to Grass Valley and its earlier surroundings.

To-day we find mining operations carried on more extensively and on a more permanent basis than during any time of its history. The equipment of the mines with power is better than that of any other district in the world. An abundance of water power varying in head from 100 to 770 feet, according to locality; electric power, to the extent of 2000 H. P., brought into the district as a competitor, and the price of wood, ranging from $3 to $6 per cord, are the available facilities for power, thereby reducing the cost to a minimum.

The several means of generating power have been illustrated at the different mines in operation, giving an opportunity to judge impartially the cheapest and most efficient.

The number of stamps in Grass Valley district is 313, of which 238 are at present in operation. There are a total of eighteen mills—six equipped with steam, eleven with water and one with electric power.

There are thirty-four hoists, all of which are provided with steam plants, two of which are also supplied and operated with compressed air and ten with water power.

The pumping capacity of the several plants aggregate over 8000 gallons per minute, or about 730 miners' inches of water—the Cornish system being the general one in use. Among these are three compressed air pumping systems, aggregating 2800 gallons per minute and using the Dow and Knowles pumps.

Over ten miles of hoisting shafts have been sunk on the different mines throughout the district, the most depth on the slope of the vein attained being 3150 feet and a vertical depth of 3182 feet.

There are also over fifty-one miles of drifts and crosscuts run in the development of the many veins, without taking into consideration the upraises and winzes.

The stoped area does not exceed 12,000,000 square feet, which ore could be crushed by the 313 stamps working incessantly in a little over nine years.

The estimated production of gold from the district is $100,000,000, and the largest production of any one mine in the district is a little over $12,000,000.

There are about 250 mining locations, most of which are covered by patent, and varying from the old original "square claim" and those procured under the mining acts of 1866 and 1872.

At present there is more activity in mining than there has been for many years and the future of Grass Valley never looked more promising.

CHAS. E. UREN.

Grass Valley, Cal, March 25th, '97.

The following is from the well known mining engineer, Mr. W. F. Englebright, and was written to accompany the map:

Nevada City Mining District.—This district is situated northeast of and adjoins the Grass Valley mining district, and takes its name from Nevada City, the county seat of Nevada county.

Since the year 1849 it has been the scene of active mining operations—first, in the working of the shallow placers and ravines, which were among the richest discovered in the State, and then the systematic working of the deep ancient river channels and extensive quartz mines. During all this time mining in this district and the production of bullion have been continuous, which, for a record in gold mining, is worthy of note in the history of our State. To-day mining in the district stands on a more permanent basis than ever before, as the developments in recent years in both the gravel and quartz mines warrant a continuation of prosperity for many years to come.

There are now running sixteen hoisting and pumping works, with over two miles of incline or perpendicular shafts, and over twenty miles of tunnels and drifts open, in working shape.

The greatest depth thus far attained is 1800 feet on the incline, making a perpendicular depth of 960 feet, and the most valuable and extensive ore bodies opened in the district were in recent years uncovered in these deep workings.

There are 210 stamps running in the district, with forty stamps on mines not in active operation. All of the mills are of modern construction, fitted up with all the latest improvements for the reduction of ores and gold-saving machinery. Water is used for power under pressure of from 200 to 400 feet, there being about 1000 H. P. used in the district to run hoisting and pumping machinery and mills; the pumping machinery is light, as the amount of water cut in the deepest shafts is comparatively small.

There are two chlorination plants and one smelter in the district.

The estimated production of gold from this district is about $75,000,000.

The annual production of gold in the past few years has been about $1,000,000. The mines of the district now support a population of over 5000, who live in Nevada City and vicinity, and this city is to-day one of the most prosperous in the State.

W. F. ENGLEBRIGHT.

Nevada City, Cal., March 24th, '97.

Practical Notes on Hydraulic Mining.*

NUMBER II.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE H. EVANS, C.E., M.E., General Manager Cons. G. Mines of Cal., Ld. Oroville, Cal.

Grades, Capacity, etc.—In connection with the grades and various shapes of water races, the following points require particular attention:

First—As before mentioned, the character of the ground through which the ditch is constructed will have a great bearing on the grade required, but, as a guide, it will be well to remember that practical results have demonstrated that, in ordinary ground, the water should travel at the rate of from 180 to 200 feet per minute. Then the grade will be determined by the dimensions of the ditch, and its intended carrying capacity.

Second—Races in which the water flows at too high a velocity through ground of a porous nature will never be free from leakage, owing to the fact that the velocity of the water will not allow any sediment to settle, and in all ditches properly constructed the sediment traveling with the water at a moderate velocity is always relied upon to entirely tighten up all portions of the ditch cut through ground of a porous nature; and, again, if the velocity is too high, it will scour holes in the bottom and sides of the ditch when constructed in sandy or clay soils. By neglecting these points, the cost of maintaining will unnecessarily be increased.

Third—To establish the grade of a ditch when the velocity and area of same is known, one of the simplest methods of calculation is as follows: Multiply the velocity in feet per minute, by the wetted perimeter, in feet, and divide the result by twice the area in square feet, and the product will be the total fall in feet required to each mile. To reduce this fall to inches, for each 12 feet in length multiply by .027. Example: Suppose we have a ditch to construct for a distance of six miles, to deliver 600 miners' inches, or 900 cubic feet, per minute, or 15 cubic feet per second.

To commence with, we are told that in ordinary ground the velocity should be about 3 feet per second, or 180 feet per minute. Now, knowing the velocity and the distance, the area required is obtained by dividing the discharge in cubic feet per second, viz: 15 by the velocity in feet per second, viz., 3, the result shows that an area of 5 square feet will discharge the quantity of water required, and in order to have the ditch or flume constructed with least amount of friction, the width of the bottom must be from 1¾ to 2¼ times the height of the sides, and in this instance the section of the ditch or flume would be 3 feet in bottom, with 1 foot 8-inch sides.

Having now the velocity and area, we next find the wetted border or perimeter—in other words, the length—of so much of the bottom and sides as is wetted by the water; for instance, if a flume or ditch is 30 inches wide and 12 inches deep, its wetted perimeter, when full, is 30+12+12=54 inches, or 4.5 feet, and the same ditch or flume, if empty, has no wetted perimeter at all. Now, fully understanding the meaning of wetted perimeter, we find that the ditch or flume in our example has a wetted perimeter = to 3 + 1 ft. 8 in. + 1 ft. 8 in. = 6 feet 4 inches, which, for convenience in calculating, we reduce to decimals, and have 6.33. We now have the following results, viz: Velocity, 3 feet per second; discharge, 15 cubic feet per second; wetted perimeter, 6.33 feet.

To find the grade, we first multiply the velocity in feet per second by itself, and in this instance the result is 3×3=9, which has to be multiplied by the wetted perimeter in feet, 6.33; therefore, 9×6.33=56.97, this total has to be divided by twice the area in square feet, viz., 5×2=10; therefore, 56.97÷10=5.69, the total fall in feet per mile. This result is practically correct for flumes and ditches of short length in good ground, but allowance must be made according to the roughness and the contour of the ditch.

A more difficult, but correct, formula, which has been obtained from actual experiments made in connection with ditches constructed in ordinary ground, with the usual winding course and short bends, is as follows: Velocity in feet per second = 6 times the square root of 2×G×R×S. Where G is the acceleration of gravity, or 32.2, R is the hydraulic radius, which is found by dividing the sectional area of the ditch in feet by the wetted perimeter or border in feet, and S, the sine of inclination, or the total fall or grade in feet, divided by the total length in feet.

If the ditch is constructed through rough country and the bottom or sides of same present rough surfaces to the water, then 5 times the square root of 2 g r s will give the mean velocity in feet per second, and the velocity multiplied by the area in square feet will give the discharge in cubic feet per second, which result multiplied by 40 will give the discharge in miners' inches.

Example: To find the velocity and then the discharge in cubic feet per second, and miners' inches from a ditch with a fairly straight course, and constructed through good ground, having the following dimensions and fall, viz.: Section of ditch, 6×3 feet; fall or gradient, 8 feet to the mile; length of ditch, 15 miles.

We first proceed by working out R, which we are told is the sectional area of ditch in feet divided by the wetted perimeter in feet, and in this instance it is $\frac{6\times3}{6+3+3}=\frac{18}{12}=1.5$.

S, or sine inclination, will be found by dividing the fall by the length, or $\frac{8}{5280}=.001515$.

Since twice G (the acceleration of gravity) is 2×32 2, or 64 4, we have G, R, and S, and our formula stands as follows:

6 times the square root of 64.4×1.5×.001515, and the easiest method of calculation in this case is by logarithms, as follows:

	Log's.
2g=2×32.2 or 64.4	=1.8089
R=1.5	=0.1761
S=.001515	=7.1804
SQUARE ROOT=2 | 19 1654	
	9.5827
×6	0.7782
	10.3609=2.29

Answer 2.29 feet per second velocity, and this multiplied by the area, 18 square feet=discharge, or 41.22 cubic feet per second, or 41.22×40=1648.80 miner's inches.

The above formula is also correct for flumes with sawed boards, and battens over the joints inside the boxes, but instead of using 6 or 5 as a co-efficient the formula must read $8\sqrt{2grs}$ for velocity in feet per second, and $8\sqrt{2grs}$×area for discharge in cubic feet per second.

I might add here, that these last formulæ have been practically tested by several authorities, and especially by the Government engineers of New Zealand, to whom I believe belongs the credit of arriving at the exact co-efficients shown above.

As before mentioned, it is of great importance that a safe allowance should be made for loss due to leakage and evaporation, more especially when the line of ditch does not pick up any small creeks or springs on its course, and it is agreed by the best authorities that a suitable allowance may be calculated by the following formula:

$$M\times\frac{\text{Sectional area of ditch in feet}}{\text{Mean velocity in feet per second}\times5280}$$

Equals the loss in cubic feet per second per mile, where M is a co-efficient varying from 3 to 20, according to the climatic conditions of the country through which the ditch is constructed.

In New Zealand, on the west coast and, in fact, all through the middle island, good results have been obtained by using 3 for a multiplier, but again in the north island, where the climate more resembles this country and the loss due to evaporation is heavy, it is necessary to often use as high as 20 for M, in order to obtain satisfactory results.

Fourth—When, owing to weak banks it is necessary to build walls on the lower side of a ditch, the ground should be removed to obtain a solid foundation, and two walls—an outer and an inner—should be built up, with space enough between to allow a good puddle clay to be rammed in; such a wall, if properly constructed, will never give further trouble.

Fifth—All earth, trees, roots, etc., must be moved quite clear of the lower side of the ditch, with the exception of just sufficient to make a track. Unless all waste materials are moved to such a distance that they will not become a heavy drag on the lower side of the ditch, slides will be frequent and costly.

Sixth—At the entrance of tunnels, commencement of flumes, and at other points where the velocity of the water is considerably retarded, the effect of water changing its form at such places is an important point, and must never be neglected; in fact, all calculations referring to the flow of water in ditches, etc., the mean velocity must be determined as accurately as possible.

Before going further, many readers will appreciate the following simple method of arriving at the areas or cross-sections of the different forms of ditches, sluices and flumes, which may be calculated as follows, viz:

To find the area of a section of a flume or ditch with straight sides, multiply the width of bottom (in inches) by height of sides (in inches), the product will be the area in square inches, and this divided by 144 will give area in square feet.

Example: What is the area of a flume or ditch 28 inches wide and 18 inches deep? Answer: 28x18=504 sq. in., which, divided by 144, = 3½ sq. ft.

(To be Continued.)

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Mining Summary.

CALIFORNIA.

Amador.

(Special Correspondence).—At Pine Grove the Dane mill is now running on rock from the Mitchell mine, half a mile away. The rock is low grade, but is being quarried out from the surface, and the ledge is wide.

The Reward mill is making a run on a good shoot of rock, and the outlook is encouraging.

The old Markiee mine, near Volcano, is soon to be reopened by a San Francisco company. This mine was worked down to a depth of 500 or 600 feet in the seventies, and ore to the value of about $1,000,000 extracted. It is believed that large masses of comparatively rich ore were left in the various levels, as too low grade to prove attractive at that time. A dump of some 10,000 tons is estimated to be worth $2 to $3 per ton, and can be milled at a cost not exceeding 75 cents per ton.

The Robinson or Treasure Hill mine, near Volcano, is being actively exploited under the superintendence of Mr. T. B. Dillon. It appears to be an immense deposit of gold-bearing porphyry, with innumerable quartz seams running through it in all directions. The outlook is very favorable for a long period of profitable milling.

Ledger: On the Mahoney the mill is again running, though the inflow of water is so great that the lower beds have not been reached yet.

H. L. Whitney, who is operating the Lighthouse mine, intends to erect a 5-stamp mill on the property.

The crosscut on the Alma has encountered the footwall ledge and drifting is progressing both north and south in good-looking ore.

Record: A new shaft has been started at the South Eureka mine to the east of the present one. It is expected to sink it about 600 feet.

The Argonaut mine has just crushed 100 tons of ore at the Zeile mill and it yielded at the rate of $12.50 per ton. The crushing made previous to this paid $9 per ton.

The directors of the Potazuba have decided to sink the main shaft deeper and open new levels, and the work is to begin at once.

Butte.

Register: J. R. Lightford & Co. of the Indian Spring mine will shortly have a 850-foot shaft bored. They are now in 2400 feet with their tunnel, and in order to work the gravel to better advantage they will have an 8-inch hole bored from the surface down to the tunnel. Then a pipe will be put in the shaft and 200 inches of water will be used to wash the gravel. The boring will have to be done through lava rock until within 8 or 10 feet of the tunnel. They expect it will take about three weeks to complete the boring and get the pipe in place.

Calaveras.

Chronicle: A rich strike was made last week in the Blood mine, which was worked years ago, but abandoned when the vein was lost.

The North Star mine at Mokelumne Hill is working a 10-stamp mill and twelve men.

Prospect: Stent men have the Brunner mine and are now pumping out the water. Some good rock has been found.

The shaft in the Tryon mine is now 200 feet deep. A drift was run in 26 feet of solid quartz without finding the opposite wall, showing that the lead is widening with depth. Drifting was discontinued and sinking resumed.

W. Garrard is sinking on the old Brown mine, below the new Stickle hoist. The shaft is now about 80 feet deep and good rock is being taken out.

The tunnel being run by Shepherd & Co. at Robinson's Ferry is now in the hill 1300 feet. The ore is low grade, but indications for better rock are favorable.

F. Baumhogger has resumed operations on the Great Western, between Altaville and Angels. Sinking in the shaft, which was already 100 feet deep, has been commenced. The vein is 10 feet in width; the ore has proved satisfactory.

El Dorado.

(Special Correspondence).—Summers and Miller of San Francisco are taking ore from the Gray Eagle, Mammoth and Myrtle properties and crushing at the Mammoth 10-stamp mill above the confluence of Weber creek and the American river. The ore is fair grade and rich in sulphurets.

A Chinese company bought a large tract of land, built impounding dams, and are hydraulicking, near Volcanoville. The property is known as the Flora mine.

The Two Channel Mining Co. on the Georgetown divide has completed a new tunnel 750 feet and tapped the lowest part of the channel. The tunnel is timbered with 7-foot posts, 3½-foot caps in the clear, and laid with T-rails. The 10-stamp mill will soon be running at one end of the property, while a hydraulic plant is in operation at the other. W. C. Green is the superintendent.

The Morris mine, an extension of the Two Channel, has extended the old tunnel and made an upraise 18 feet into the gravel. The tunnel is 600 feet long. This is a milling property.

L. P. Burnham of Oakland has bonded from Barrette Bros. and others the old Crystal mine for Eastern people. At 190 feet the shaft was abandoned nine years ago. There is a 10-stamp mill on the place. Work has been started to pump the shaft and also to run a tunnel. The property is two miles south of Shingle Springs.

The Star Light Co. are extending the 270-foot level from the south to the north shaft—a distance of 600 feet. They are taking out a very good grade of ore.

Eastern people are negotiating for a bond on the old Pocahontas property with a view to pumping the shaft and examining thoroughly this one-time rich property, on which the relics of three score of arrastras are plainly visible. The mine was worked by Spaniards in the 50s, and was taken up under bond about a year ago by a corporation, whose bond expired within the past month.

The Big Sandy Co., of Toledo, Ohio, whose works are located at Kelsey, are negotiating for the "old Jim Marshal property," latterly known as the Gray Eagle, the north extension of the Big Sandy.

The old Mount Pleasant near Grizzly Flats was transferred within the past few weeks to people who will soon renew operations on this old-time dividend-paying mine, which was abandoned at a depth of 700 feet about ten years ago.

On the 8th inst. the German quartz mine, situated nine miles south of Placerville, was sold by Hager and Straten to Chas. O. Richards of San Francisco for $12,000. The shaft is down 132 feet. There are two known ledges at this point about 40 feet apart, each said to be above 4 feet, of pay quartz in stratified slate. Work is to be actively inaugurated within a week. The ore is fair grade and rich in sulphurets. It is a mother lode property.

Raymond and Turner have reached 25 feet in shaft and 35 feet in tunnel on a 3½-foot ledge of $10 ore, about 4½ miles south of town.

The lumber output for the coming season in this county will be enormous as compared with other seasons, judging from the contracts made with properties under development. The contract price is $15 per M. delivered at the mine.

H. E. Casey is running a bedrock tunnel on the old Ames property, within a mile from Placerville. He has reached 800 feet and cut over 3 feet of pay gravel. He has just entered the channel and will soon be ready to erect a mill.

At the Griffith Consolidated a new tunnel has reached about 75 feet, with a prospect of 600 feet backs, cutting probably five ledges.

D. H. Jackson has a crew at work sinking on the Marguerite, a mother-lode property, near the old Superior mine, about three miles south of town.

Placerville, April 12, '97.

Placer Argus: E. M. Smith of Coloma has received returns from copper ore sent to England from the Lily Emma mine near Greenwood creek. The return shows 16 per cent copper, 8 ounces of silver and $3.25 worth of gold to the ton. The English syndicate that has been talking of purchasing will probably take the mine if the ore body proves to be large enough to justify them in purchasing.

Nevada.

Union: At the Home mine on the 320-foot level a strong body of ore has been encountered which is over 3 feet wide. The quartz is high grade. This is the same chute of ore which was cut about 90 feet above where the present strike was made.

Placer.

Sentinel: Supt. J. A. Shields of the Glen Consolidated gravel mine reports that the mine continues to pay well. Six men are now at work and the force will be increased this spring.

The Hidden Treasure Gravel Mining Company have ceased operations at the tunnel at Sunny South and will devote their entire attention to their works at the Dam tunnel at Centerville. The Hidden Treasure Company now have seventy-five miners at work breasting gravel at Centerville.

D. Harmon, formerly superintendent of the Mayflower mine, is now in charge of the California quartz mine near Graniteville, owned by the Shasta Mining Company. A bedrock, 2000-foot tunnel is running to tap the ledge below the old works. The tunnel is now in 1675 feet, 162 feet having been made during March. The vein is on the contact between slate and syenite, and workings near the surface developed a pay chute of nearly 1000 feet.

Argus: The Bullion mine, near Ophir, which has produced some excellent ore, but which has been idle for some time past, has been bonded and is now being worked by H. E. Ladd and J. C. Rude.

The Eclipse mine was started up on Wednesday last under the management and superintendency of Ben Hawkins. At present, while drifting is going on, only five stamps will be run, but it is expected they will start the other five stamps soon.

Work has been commenced on the shaft for the Golden Blossom Company. The shaft in the clear is about 7x15 feet and when timbered complete will accommodate three compartments of 4x4 feet each. The new hoisting works will be erected with a view of sinking from 1000 to 1500 feet.

Plumas.

Independent: A large amount of capital is to be expended by English capitalists on the group of quartz mines consisting of the Kettle, Caledonia, Baker, etc., consolidated as the Green Mountain. An estimate of the cost of driving a tunnel 2000 feet in length, which includes machinery, has been made and the determination reached to expend $100,000 on the enterprise. Three eight-hour shifts will be put on and the tunnel driven without intermission. This is the first time in the history of the Green Mountain that a thoroughly business-like proposition has been entertained in regard to its proper development.

National-Bulletin: At Granite Basin Mr. Pratt, a New York capitalist, has the Morning Star bonded and is prospecting by a shaft which is now down 90 feet. When to a depth of 100 feet, drifting will begin. On this property fifteen men are now employed, and later ten more will be added. J. E. Frick is the superintendent.

John R. Perkins has directed Horace Waldron to employ men and begin taking ore out of the Homestake mine.

San Bernardino.

(Special Correspondence). — Providence Mountain district is producing high-grade ore. The old Trojan district is evidently entering upon a prosperous era. It is a twenty-five-mile down-hill haul to Fenner, the nearest station on the Atlantic & Pacific Railroad. The cost from mine to car is $10 a ton. A great deal of the ore runs about $100 a ton; some as high as $400 or $500.

Notwithstanding the low price of silver, a number of shipments of ore have lately been made from the Ivanpah district, in the northeastern part of San Bernardino county.

Don Palmer of St. Louis and W. E. Van Slyke of San Bernardino are developing a group of mines—copper and gold—in the Sunrise mountains, eighteen miles southeast of Needles. They have a shaft down over 100 feet and have done considerable tunneling. Should the ore bodies hold as well as they now appear, a mill of at least forty stamps will be erected on the Colorado river, near the new Atlantic & Pacific bridge.

John and Rudolph Flynn are running an arrastra on picked ore at the Mountain Jewel mine, eighty miles north of Needles. Power is furnished by a gasoline engine.

There has been talk of erecting a smelter at Needles. A Denver expert named Davis, seconded by the business men of the desert town, has been investigating the mines adjacent to that point. It is said that, if his report is satisfactory, a plant with a capacity of at least 100 tons a day will result.

Everything seems to be going forward favorably in the Virginia Dale district. Miners at the Desert Queen are now taking out ore that averages 50 cents to the 100-pound sack. The forty-ton mill at the old Virginia Dale mine is running nearly all the time, and the owners express themselves as being satisfied with the returns. In the Pleasant Valley mine Prince & Christy have opened up an 11-inch ledge of rich ore. The county is building an excellent road from Amboy, on the Atlantic & Pacific, to Dale City. G.

San Diego.

Union: The bonding of a group of mines in San Mateo canyon owned by W. S. Clark, to an English company, has caused renewed interest in that section. The mines were bonded for $25,500, of which the first payment has been made, $5,000 being due April 1, and the balance due in three quarterly payments. The English company proposes to erect a smelter at once. The mining district is about twenty-five miles from Fallbrook, in the Santa Rosa mountains.

Shasta.

Searchlight: The London-Burton property of Centerville mining district will be started up shortly.

R. G. Hart has completed the tramway from the Central mine to the river. Twenty men will take out ore for shipment to the Keswick smelters.

Siskiyou.

News: Four days of good weather has enabled the Klamath Flume and Mining Company (the Big Four Company) to complete their second preliminary survey. They will adopt the second survey—the tunnel route—which will cut off eight miles of the distance.

Mr. Garrett, who purchased the bar just across the river from Hamburgh, has begun work on his claim. The mine will be worked by means of a large derrick and a good sized force of men will be employed.

A sawmill has been erected at the Aurora quartz mine in Cherry Creek district, which will provide the lumber for extensive buildings on the property. A 10-stamp mill will be put up, with a forty-horse power engine and a sixty-horse power boiler.

S. J. Fore, who is developing the Last Chance placer mine, near Callahans, turned water into the new ditch last week. The pipe has been laid and all machinery is in place ready to start the elevator.

Journal: Smith and Hunter have removed the machinery and pump about 160 feet southwest of the shaft lately sunk at the Greenhorn Blue Gravel mine, and are sinking a new shaft to strike the main channel.

S. J. Fore is getting machinery and lumber over to McAdams creek to put up a sawmill at Hi Yu gulch, where he has a quartz mine. As soon as the sawmill is in operation, he will put up a quartz mill.

Superintendent Brokaw of the Steamboat mine, on McAdams creek, near Fort Jones, is expected to start up work soon.

The Horse Creek Mining Company's claim on the Klamath river is being worked with a good supply of water in the ditch, to keep the giants constantly in operation.

Some fifteen Chinamen are working a claim on Klamath river, below the mouth of Horse creek.

The Distlehorst-Barton dredger is at work below Oak Bar. The dredger has handled an immense amount of gravel since it was built and has paid the owners fairly well. They expect some time to strike a rich bed of gravel, as there are certainly plenty of them in the Klamath.

The new shaft in the Greenhorn Blue Gravel mine is down about 70 feet, and in another week will be at bedrock and on the main channel. As soon as bedrock is reached, a larger force will be put on.

Reporter: The mine of Martin Shuler, below Scott river bridge, week before last produced about $350 for the labor of three men. In this amount there was one nugget weighing $114 and another worth $68, besides several smaller ones ranging from $5 to $30. The week before a nugget worth $180 was found.

The Columbia mine has a full crew at work and the ore taken out is very good. The mill is running steadily.

Capitalists are negotiating for the Gumboot mine, owned by Simon Bros. & Co.

Journal: The Seattle Placer Mining Company, at Nolton, are running full blast.

The Siskiyou Gold Mining Company, below Happy Camp, had a cleanup a few days ago, and sent $3000 in gold dust to Fort Jones for shipment.

The American Bar Company, on the Upper Klamath, commenced hoisting a few days ago, and find the gravel prospecting well.

The hydraulic mines along the Klamath are doing well. The new companies which have put in modern machinery and obtained a plentiful supply of water, are well satisfied with the expenditure of their capital.

At the extension of the Siskiyou mine, a ledge on the Hamburg, owned by Raynes, McCook & Farraher, some of the richest ore ever taken out in Siskiyou has been found.

Trinity.

Journal: There is a splendid field for prospectors in Trinity county in the Trinity Center and Coffee Creek districts, on Canyon creek and Stuart's Fork, East Fork, Rattlesnake, New river, Hay Fork, and Wildwood, and along the Lower Trinity. A large amount of capital is seeking gold investment in this State and nothing stimulates the prospector more than the fact that a promising location is readily salable at a fair compensation.

Hall & Carpenter will shortly put up a roller mill, equal to 4-stamp output, on their properties on the Trinity county side of the Harrison gulch lead.

Tuolumne.

Union-Democrat: At the Rawhide the shaft is down about 1070 feet, with 230 more to go before crosscutting. At present a force of miners is employed on the 900 and 1000 levels, drifting, stoping, etc., and all rock reduced in the 40-stamp mill is being taken from these points.

At the Dutch high-grade ore continues to be extracted from the workings of this mine, almost altogether from the 200 and 300 levels.

At the Rappahannock sinking is still going on below the 600, and the extra 30 feet for a sump has almost been attained. Immediately or reaching this depth crosscutting, drifting, stoping, etc., will be commenced with a large force of miners. The ledge shows very strong, carrying a wall to wall width of 35 feet.

At the Tarantula sinking continues night and day in shaft No. 4. The vein which by actual test went up into the hundreds per ton, is widening.

The Leap Year is driving in its tunnel for the big channel in Table mountain, but is also running out some first-class gravel as it goes along.

Development work on the Santa Margarita, Hog mountain, has been commenced.

The Philadelphia mine, on the North Fork of the Tuolumne is being developed under the supervision of W. H. McClintock.

A great many pocket miners have recently located on Bald mountain, recognized as one of the best districts in the world for that class of mining.

NEVADA.

Carson *News*: Rapid progress is being made on the cyanide plant at the old Eureka site, which is being constructed by McCone, Cain & Woodbury. This plant is being put up to work what tailings are left at that place, and will also work the Chollar tailings and the large batch that lie behind the old foundry just this side of Silver City. The plant is of 120 tons capacity per day. It will be ready to begin operations before the first of next month.

De Lamar *Lode*: Dwyer & Jacobson are getting good assays from a 15-inch streak in their claim, the Defender, between De Lamar and April Fool properties.

On April 1st the April Fool Gold Mining and Milling Company made a reduction of 50 cents a day on the miners' wages on their property.

Nearly all of the machinery for the new additions to the De Lamar mill is being put in place. Several new leaching tanks are now in operation, and when everything is completed over 300 tons a day will be worked.

Gold Creek *News*: The Gold Creek Mining Company have built fifteen miles of ditch during the winter and thrown up a dam and a dike that contain 62,000 cubic yards thrown up to make the reservoir. The length of the in-take ditch is 42,380 feet, outlet 33,800. There is a by-pass ditch to take the water from the in-take around the reservoir 2700 feet long, and two small ditches to bring the water in from Big Bend and Mill creeks, 325 and 400 feet respectively. The reservoir tower is 50 feet high. The dam itself is 44. This tower will eventually form a well of solid masonry.

Territorial Enterprise: Work is to be commenced on the Zadig tunnel, which was started some time ago for the purpose of draining various of the Silver City mines. John Kelly of Bodie has become interested in the proposition and will take an active part in the furtherance of the enterprise.

At Ely lumber for a mill for the Chainman mine, which was recently sold to C. D. Lane and others of California, is being hauled in, and the company will no doubt go ahead with the opening up and draining of the mine which has so long stood idle. Pumping machinery and pipe is being taken in.

The Egan mine at Egan canyon is making preparations for heavy machinery.

Many big outfits are waiting at Wells to go into the Contact district at the head of Salmon river, on the Idaho and Nevada line, sixty-five miles north of Wells.

OREGON.

Baker City *Democrat*: The owners of the Virginia Consolidated mine have decided to put in a station at the present depth of the shaft, 500 feet, and crosscut to the Virtue ledge; also to continue deep sinking 200 feet farther and then crosscut the same as above.

A cleanup of $10,000 was made last week at the Bonanza, the result of eighteen days' run with twenty stamps. Sixty tons of concentrates were saved during the run which will yield a net profit of upwards of $3000.

The Burnt River Mining Company own all of the numerous quartz claims on what has been known for some years as Gold hill. The

mines are located twenty-seven miles southeast of Baker City. There are a series of drifts on ore showing the existence of at least ten parallel veins. The ore in the veins runs from 20 inches to 4 feet. A crosscut tunnel has been started on the Spring Gulch mine, to cut all of the lodes at nearly right angle. This tunnel is already in over 300 feet, and when it is a little over 2000 feet in length it will be 1250 feet below the summit of the mountain.

Grants Pass *Observer*: Kramer & Wheeler have bought the Henry Hutchins mine on Pea Vine mountain, in the Galice Creek district, and will soon commence the erection of a quartz mill.

WASHINGTON.

Spokesman-Review: At Nelson the Reservation Mining and Milling Company are working a large force of men on their property near the boundary, and but for the present transportation facilities the property would be a shipper.

A Spokane company has recently stocked a group of claims in Vulcan camp and intend putting men to work at once.

At Boundary the general development work which the Bald Eagle Company has been carrying on during the past five months has satisfied them of the permanency of the ledges, and now they have laid the permanent tunnel for working the property.

BRITISH COLUMBIA.

Spokesman-Review: The shipments of ore from Rossland during the week ending April 3 were: Le Roi 851 tons, War Eagle 144, Iron Mask 96, a total of 1091 tons. There was shipped from the Trail smelter during the past week 142 tons of matte. The amount of ore milled by the O. K. Company was 123 tons. The total shipments from Rossland from January 1 to April 3 were 15,031 tons.

A number of big payments have been made on bonds on properties in the Trout Lake district. The Horne - Payne Syndicate paid $23,400 on the Broadview, Old Sonoma and Phillipsburg. The English company owning the Great Northern paid $10,000.

At Sandon during March there was shipped from the Ruth mine 690 tons of ore, from the Payne 1150 tons, and from the Slocan Star 360 tons. The Slocan Queen, adjoining the Slocan Star, has a showing of 14 inches of ore in the face of the 175-foot tunnel.

At Greenwood work will be shortly begun on the Anaconda group of claims, Deadwood camp. This group consists of the Anaconda, Kootenay and Columbia, and is owned by E. A. Bielenberg of Greenwood. They have an extensive surface showing of copper and iron pyrites.

At the Jewel, Long Lake camp, the shaft is down 120 feet, and the showing of ore has improved.

The work which has been carried on at the coal deposits at Rock creek for some time has resulted, it is reported, in the striking of another seam of coal of an excellent quality.

At Camp McKinley last week the Dongola group of five claims was bonded to T. H. Calland of Vancouver, who represents an English syndicate.

The Combination tunnel is well under way, and it is expected that work will be continued on this property all summer.

The Gold Bug and Hidden Treasure claims, in Deadwood camp, have been sold to Adolph Drucker, M. P., of Northampton, England.

The Lead King group of claims has been bonded, through W. T. Thompson of Midway, to an English company. The group lies about one mile south of Anaconda.

At a distance of 230 feet from the mouth of the tunnel the hanging wall was struck on the Mother Lode claim, Deadwood camp. The first 27 feet was in solid rock; the balance of the distance, or 203 feet, was all in ore, some of which was of a good grade.

ALASKA.

Mining Record: Again the warning is sent out from the Yukon to all to stay out of the country unless abundant supplies are taken. There will be work for a large number of men and wages will not be less than $10 a day, but all men hired will be required to board themselves, and it is more than likely that those who come with less than a year's supplies will be refused work. If a claim owner employs a man who comes without provisions he forces a division of his own scanty stock, and is thus cutting his own throat and insuring the doubling of his own privations. The companies cannot possibly carry in enough to supply those already there; any addition to the number to be provided for must bring starvation to all.

Concerning the big returns from single pans of dirt, it should be remembered that the dirt is invariably taken from bedrock, and in these immensely rich spots the pay streak is always thin, sometimes not more than 2 or 3 inches. On the other hand, an example is found in the Rhodes claim, where the gravel runs from $2.47 to the pan on the upper strata to $4.99 at bedrock, with a pay streak 9 feet deep. On such claims as this no barren dirt need be handled, and the net profits equal those where the richer, though very much smaller, pay streaks are found.

UTAH.

Mammoth *Record:* In the Home Rule Consolidated a 5-inch vein of ore, which assays forty ounces of silver and 30 per cent lead has been encountered in the drift which has been run for 80 feet from the bottom of the 160-foot shaft.

An expert has been out looking over the Boss Tweed, and it is probable that a sale of the property will be consummated in a short time.

The new hoisting apparatus for the Mammoth mine will be set in motion within a week. It is the intention of the company to increase the output of the mine, and to push the shaft down to the 2500-level as rapidly as possible. Nearly all the ore which is now being taken out comes from the upper levels.

Peyton & Bacorn have leased the Sioux mill and expect to start the machinery as soon as a supply of ore can be secured from the Sioux.

Tintic *Miner:* Manager Johnson of the Gold Point mine at Sunshine has secured a lease and bond on the Gold Blossom mine, northeast of Eureka.

Shipments from the district for the week are as follows: From the Bullion-Beck mine, twenty-five carloads ore; Bullion-Beck mill, five carloads concentrates; North Star, two carloads ore; Buckeye, one carload ore: Dragon iron mine, one carload ore daily: Noon's iron mine, one carload ore daily; South Swansea, five carloads ore; Swansea, five carloads ore; Mammoth mill, 7 carloads concentrates.

A new strike is reported on the 300 level of the Homestake.

A good strike of ore is reported this week in the Morning Glory. The ore is in the drift from the 265-foot level, about 65 feet from the shaft.

Mercur *Mercury*: In the Camp Floyd district 503 men are employed in the mines. The figures emphasize the remarkable amount of ore mined in this district per man employed. Take the Mercur mine, for instance: With only a hundred men employed, including shift bosses, engineers, miners, timbermen and muckers, an average of thirty tons are mined and placed in the ore bins, ready for loading onto the ore train every day.

The Wonder workings are being extended rapidly. The vein has been crosscut 50 feet, and drifted on 40 feet. The ore looks exceedingly well.

Salt Lake *Tribune*: At Silver City in the Homestake 50 feet from the 300-foot level a body of ore was broken into which shows a gray copper. This, said an officer in the company yesterday, demonstrates what has been contended for some time, that in the Homestake is to be found a class of ore as good as that which has made the mines on the north famous.

State Line district has almost instantaneously discarded her winter garments. The Ophir Company are working with a full force again, and a shipment of high-grade ore will shortly arrive on the market. Favorable reports come from all properties under development in the district, and several new strikes are reported from the surrounding country.

IDAHO.

Spokesman-Review: In the Pierre's Lake district a body of rich ore has been uncovered in the Anaconda mine. Three feet of solid ore was encountered in the bottom of the incline shaft at a depth of 15 feet.

There are a number of well-known claims in the Pierre's Lake district, among them the Little Giant, Lincoln group, Big Iron, Peerless, Butte and Chief group, and others. The owners of the Lincoln will put ten men to work on their claim as soon as the weather will permit.

At Wallace a strike has been made in the crosscut tunnel on the Panhandle. A stringer was being followed, and for some time it had been showing up considerable galena, but the ledge was cut in a fine chute of ore.

The Palmer Mountain Tunnel Company have ordered a five-drill compressor plant to hasten the work of the tunnel scheme. In addition to this a complete steam plant has been ordered to furnish power to the drills and for electric lighting. The plant will be in operation by June 1. The tunnel is now in 250 feet and at a distance of 150 feet farther they expect to intersect the vein on the Tunnel claim at a depth of 170 feet. The next vein to be intersected is the Final, 300 feet from the Tunnel vein. One hundred feet farther on is another vein, which traverses the Final on the surface.

De Lamar *Nugget*: A mining company has changed the channel of the Clearwater at Webfoot, ninety miles above Lewiston, and will work the channel of the river for placer gold. The water was turned through an old channel by means of a dam 225 feet long. In years past miners have made from $5 to $6 a day with a rocker, but the Indians drove the miners away.

At Gem the Formosa mill has been started. This will be the first new Cœur d'Alene mine to commence shipping this year.

Near Kendrick, on Big Bear creek, where copper ore was recently discovered, several claims will be developed this season.

At Mullan, Miles C. Moore will soon have a force of men at work on the Central, on the mountain side south of town. He is interested in gold properties near Pierce City, to which he took a quartz mill during the winter.

MONTANA.

Walter S. Kelly makes the following report for February to the English stockholders of the Elkhorn mine: Dry ore panned, 1196.33 tons; average assay value ounces, $35.32; average per cent salt used, 15.39; average tailings, ounces, $3.03; average per cent saved, 92.67; number Dore bars produced, 37; number ounces fine silver produced, 37,616.69; number ounces fine gold produced, 33,459; batteries in service, 21½ days; pans in service, 28 days. Shipments of smelting ore: Lot No. 3, 30.8075 tons; proceeds, $1918 69; Lot No. 4, 26.4770 tons; proceeds, $1872.19; total, 57.2845 tons; proceeds, $3790.88. Result of month's operations: Estimated value of bullion shipped, $24,076; surplus on January shipments, $790.91; net value of bullion, $24,866.91; returns from ore shipped, $3790.88; total receipts, $28,657.89; current expenses, $28,488.87; profit for February (or at $4.90 to £ sterling equal to £10.5), $5168.92.

Miner: At the Original mine sinking on the incline shaft is again in progress from the 900-foot level. When the 900 was reached a station was cut and now another 100 feet will be sunk before another station will be made. From the 1,000-foot level some crosscutting will probably be done and it is thought probable that the main vein running through the Gagnan will be found near that level.

Inter-Mountain: The deal for the sale of the Gold Hill mine is closed by which J. K. and C. W. Clark, E. L. Whitmore and A. J. Johnson become the owners for $100,000, cash payment of $2,500 having been made to bind the sale. The property is at Gay Lord. Work will be continued on the upper tunnel, and another tunnel 200 feet lower down will be run. This tunnel will give a depth of about 360 feet. Besides this claim the new owners have bonded 6 adjoining claims upon which little work has been done, but which may prove valuable later.

The sale of the Michael Davitt, a small fraction lying east of the Pennsylvania and south of the east line of the Rarus, to the Montana Ore Purchasing Co. for $351,100, was a surprise to the mining men of Butte, who had no idea that the property would bring that figure. It is very generally believed that the strip of ground is looked upon as a key to the lawsuit now on between the Boston companies and the Montana Ore Purchasing Co. The Michael Davitt is an L-shaped fraction, its greatest length being about 550 feet, and its greatest width about 400 feet.

SOUTH DAKOTA.

Black Hills *Times*: Negotiations are pending for the sale of the Keystone to an English syndicate. The Keystone is a big mine, but the ore is low grade, not to exceed $4 per ton, and cannot be made to pay the profits expected in mining with the present limited facilities for treating the ore. With a 100-stamp mill, equipped with modern automatic feeders, etc., it can be made a splendid proposition.

The Anna Creek Gold Mining and Milling Company has selected the site for its electrocyanide plant. All arrangements are ready for construction work to begin as soon as the snow goes off. Machinery has been ordered and will be on the ground in a few weeks. The new plant will have a capacity of 100 tons per day and will be completed by August 1st.

There are several very promising copper prospects situated in the vicinity of Custer peak, owned by the locators, W. M. Merritt and Wm. McMillan, upon which considerable work has been performed, exposing ore in large quantities on several different locations. A number of these copper lodes show great strength at the surface, containing carbonates and oxides of copper and iron in large quantities. The ores carry from 2 to 30 per cent copper.

The Golden Reward Company's plant is doing splendid work, running through 150 tons of ore on an average every twenty-four hours. At this rate the plant is treating 4500 tons a month, which yields at the rate of $25 a ton, $112,500 a month, or $1,350,000 a year.

WYOMING.

In the Jackson Hole district several strikes are reported every week, and as the snow is off these will be opened up and their true value determined. The granite formation contains fissure veins which carry free-milling gold ore.

Preparations are being made by the placer miners for spring work, which will be strung all along the river for forty miles. Near the lake, or head of Snake river, is the Harris Dunn Gold Mining Company's plant. This company has spent $30,000, last year worked seventy-five men, and will work a large force of men, next summer.

South of this outfit comes Miller & Bear, at the mouth of Buffalo creek.

Next on the Snake river is S. J. Brown, who spent all last summer and considerable money taking out a ditch and getting ready, which work was not completed until late in the fall. This portion of Snake river will be the scene of the most active work during the summer as it is here are located the Dead Man's bar placers, the Tortolalla Gold Dredging Company's placers, the Teton Gold Mining Company's placers, which will construct a ditch ten miles long, bringing water from the Gros Ventre river over to Snake river banks.

COLORADO.

Republican: All the early day prospectuses sent forth to unite interest in Cripple Creek companies laid heavy stress on the point that this was a dry camp. The Frenchmen who purchased the C. O. D. mine and formed the Rebecca Company to operate it had, no doubt, appreciated the advantages of mining without the hindrance of an underground flow of water. The flow that was struck has necessitated the erection of one of the largest pumping plants in Colorado, which will be in place shortly. Two of the great Battle Mountain mines, the Portland and Independence, will need such plants by the time the C. O. D. developments are completed and by that time again, there will be others. Cripple Creek is no longer a dry camp. If it is a camp at all, it is a deep mining and very wet camp. As a surface camp it could go on for ten or twenty years opening new surface chutes and scratching off the top, but for a long, enduring district, it must and will go deep and pump much water.

Blunt & Co., who are working the Fanny B., have produced $40,000 from their lease in the last four months. A drift run south from 135 feet depth has recently come into a new ore chute of fully as good grade as that worked in the 60-foot level. A pool of Cripple Creek merchants has recently taken the Bryan, on which Blunt & Co. have a bond, under a lease.

The California and Hidden Treasure mines, Nevada district, Gilpin county, owned and operated by the California Milling and Mining Company, Limited, of London, have been sold. The price and terms of sale have not yet been announced. The two properties together with the Hidden Treasure mill, were bought by the company some years ago, but have for a long time been worked at great disadvantage on account of the lack of sufficient capital, and have not yielded sufficiently to pay the interest on the mortgage of $40,000. The contract for the sale of the mines provides that the purchasers shall pay a royalty of 5 per cent on the whole output of the mines for a period of ten years, and that the ore produced shall be sent to the Hidden Treasure mill for treatment for five years.

During the month of March there were shipped from the Black Hawk depot of the U. P., D. & G. railroad, 302 ore cars aggregating 4,832 tons, which represented the mineral output of Gilpin county for the past month. As compared with the corresponding month of last year this shows a gain of 106 cars or 1,696 tons, an increase in tonnage of over 50 per cent.

The following table shows the increased ore shipment for the first quarter of this year as compared with the same period of 1896:

Months—	1896.	1897.	Increase.
January	191	335	144 cars or 2,304 tons
February	185	287	102 cars or 1,632 tons
March	196	302	106 cars or 1,696 tons

Cripple Creek *Mail*: Shipments from the Anchoria-Leland last week amounted to 154 tons. Of this amount, 54 tons had an average value of about $200 per ton, and 100 tons was low-grade stuff worth about $30 per ton.

It has been announced unofficially that the gross production from the Portland properties during the month of March amounted to from $60,000 to $70,000.

The Chicago & Cripple Creek tunnel has been driven into Globe hill 1810 feet. Two machines are constantly at work in the breast and making about 10 feet a day; a third machine is at work on the Lelia vein, discovered about 1300 feet from the mouth, and from which three cars of ore have been shipped, but not of a very high grade.

The Lillie, on Bull hill, has shipped 675 tons of ore for the month of March, which returned gross values of $23,385.95 and net values of $17,336.94. The average value of the ore mined was $34.60. The royalties received by the company amounted to $4213.91. There is still 147 tons of ore taken out in March to be heard from.

ARIZONA.

UNITED VERDE PROPERTIES.

(Special Correspondence).—The mines and reduction works of the United Verde Copper Company at Jerome are at present employing over 500 men and are handling approximately 400 tons of ore per day. The principal shaft is about 500 feet deep and from different levels tunnels have been driven, and the underground workings are extensive. The engine capacity of the plant amounts to 2000-horse power, which is utilized in hoisting ore, operating air drills, copper converters, machine shop and a 40-ton crane. A vast amount of new iron work is being put in, consisting of structural works for buildings covering the entire plant, consisting of engine and boiler rooms, converters, blast furnaces, machine shops and foundry. Additional engines and boilers and two new converters are being put in. A new reverberatory furnace has just been completed which will be used in smelting the finer ores, especially those rich in silver.

The ore when taken from the mines is first roasted in heaps, extending along the slope of the mountain in three long rows, whereby it is desulphurized. It then goes to the blast furnaces and finally to the converters. The copper bullion which is thus produced is about 99% pure copper.

The mines, smelting plant and town of Jerome are situated on the east slope of the Black Hills range, pretty well up toward the crest, at an altitude of about 5500 feet above sea level and at least 1800 feet above the Rio Verde valley, which spreads out in grand panorama to the east and south.

The town contains about 3000 people, and while a considerable amount of prospecting is going on in the adjacent territory, there is practically no mining in progress excepting that being carried on by the United Verde Company. The latter has a water system of some magnitude, the supply being derived from mountain springs.

The United Verde and Pacific railroad, which runs from Jerome Junction to Jerome, a distance of twenty-six miles, is an example of interesting engineering. Fourteen miles of the road—that portion which traverses the Black Hills range—contains 188 curves, 34 of which are of 40 degrees, 2 of 45 degrees and 132 from 36 to 40 degrees. In this distance of fourteen miles there are but two places where a train of five or six cars can straighten out.

WASCOTT.

Jerome, April 10th, '97.

Gleason, the new gold camp of southwestern Arizona, is experiencing a boom. Hundreds of men have already examined the properties of the district. The region, which is one of the most arid on the face of the globe, is now being worked over, acre by acre, scores of prospectors having been fitted out in Yuma during the past month. Among the old residents of Arizona there is little doubt that the new find is nothing less than the "Lost Frenchman" mine, one of the mineral legends of the southwest and one supposed to rest on a foundation insubstantial with the rest of the fabulous tales of Golconda found and lost.

The outfitting point for the new mines is Yuma, the only considerable settlement in the region. Transportation by stage is secured from a railroad station about thirty miles east of Yuma. It is believed that the ores will eventually be milled on the Colorado river, near Castle Dome landing, a distance of twenty-five miles. The springs relied upon to furnish water are far from sufficient for mining purposes. All this will, of course, demand capital. Till some such arrangement is made it is probable that the richest ore only will be sought, to be shipped elsewhere for reduction.

The main mine of the camp has been named King of Arizona. Parallel to it have been found several smaller ledges, running from a few inches to a few feet in width, and with assay values fully equal to those of the King. While development is naturally being first sought, the shafts have been sunk in every instance on good pay ground, and tons of ore are piled up under guard at the shaft mouths, awaiting transportation to the railroad.

Collapse of a Pair of Corrugated Furnaces.

Herewith is illustrated an accident which recently occurred on the Northwest coast, which shows the amount of deformation that a well-made corrugated furnace can undergo without leading to a disastrous explosion; also conveys the lesson that unnecessary complications in valves in piping should be carefully avoided, since they are almost sure to result in trouble.

The accident took place in one of the four compound marine boilers of the whaleback steamer City of Everett, used as a freight steamer in the coasting trade between San Diego, Cal., and British Columbia. The City of Everett was built of steel, in 1894, at Everett, Wash., and is 346 feet in length, 42 feet 8 inches breadth, and 13 feet 7 inches in depth. She has four compound marine boilers, each 132 inches in diameter and 11 feet long. The shells are of steel, 0.938 of an inch thick, and of 60,000 pounds tensile strength; and the pressure allowed by the Government inspector is 168 pounds per square inch.

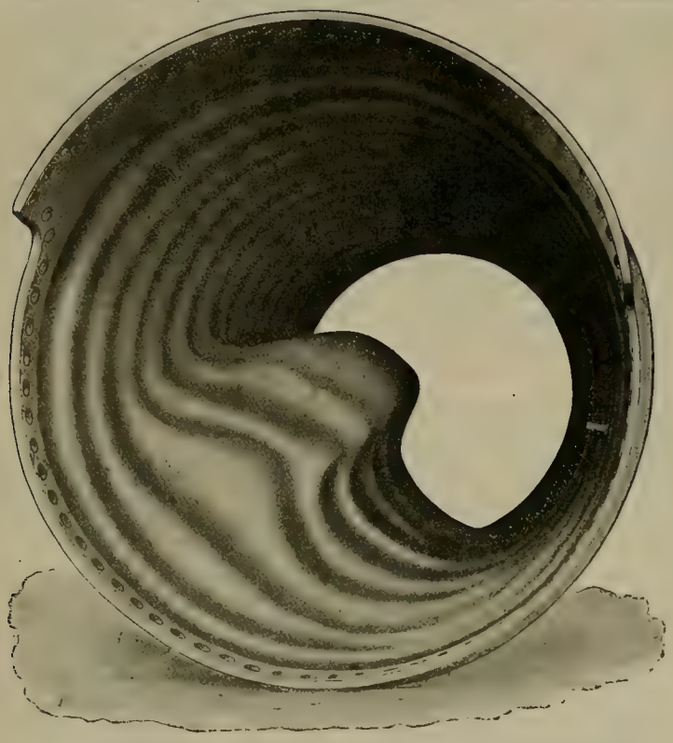


FIG. 1.—COLLAPSED FURNACE OF THE "CITY OF EVERETT."

Each of the four boilers has two corrugated steel furnaces 40 inches in diameter and 8 feet 6 inches long. The furnace, shown in Fig. 1, is from the forward starboard boiler, both furnaces of which were burned and bulged down by blowing the water out of the boiler while there was a fire in each of them.

The blow-off pipes from the four boilers are connected into cross or thwartship blow-pipes, which pass over the tops of the boilers, as shown in Fig. 2, and are provided with valves on the port and starboard sides of the vessel. It is this arrangement of the blow-pipes which led to the accident under discussion.

The vessel was loaded in British Columbia with coal, and after leaving Victoria, B. C., and while steaming across the straits of San Juan de Fuca, the engineer in charge ordered the water tender, or fireman, to blow down three or four inches of water from the starboard boiler. In carrying out this order the fireman opened the valve on the front head of the starboard boiler, and also the outboard blowing valve on the starboard side. (This will be understood by reference to Fig. 2.) After blowing down as far as desired the top outboard valve was closed. This, of course, stopped the blowing at once; but when the man came down from the ladder he forgot to shut the lower valve on the head of the boiler.

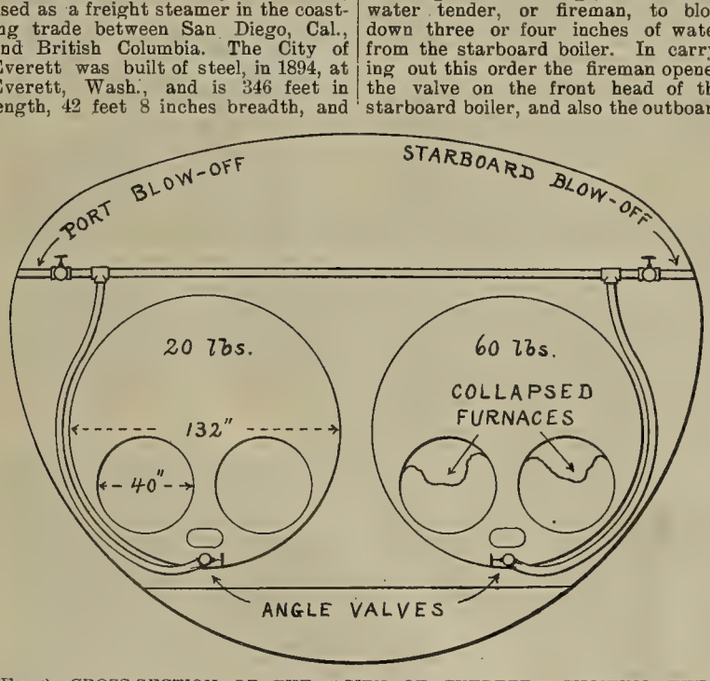


FIG. 2.—CROSS-SECTION OF THE "CITY OF EVERETT," SHOWING THE BLOW-OFF PIPES.

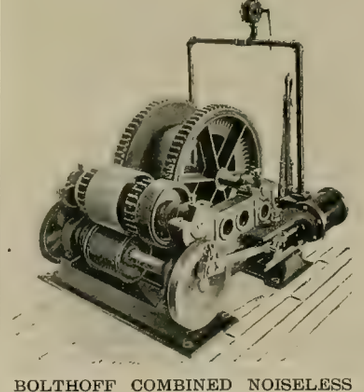
When the steamer reached Port Townsend one of the breeching bolts on the forward port boiler was found to be leaking, and the chief engineer therefore ordered the pressure to be lowered on that boiler, and that water blown out so that the bolt could be renewed. He also gave orders to wash out the two after boilers, and carry steam only on the forward starboard boiler (*i. e.*, the one on the right, in Fig. 2). Asthe Everett was to lie at the dock over night a slow fire was kept under this boiler, the fires under the other three being hauled. When the steam pressure on the three cooling boilers had been reduced to about 20 pounds orders were given to open the blow-off valves attached to them and blow down. This was done, the blow-off valve on the front head of the starboard boiler being open all this time, although it was supposed to be shut.

The result hardly needs to be told. The boilers from which the fires had been drawn were under only 20 pounds of steam, while the forward starboard boiler, with a fire in each furnace, was carrying 60 pounds, so that it emptied itself much more rapidly than any of the others. After some little time one of the firemen opened one of the doors of the forward starboard boiler, and found the furnace redhot and bulged down, as shown in the engravings. Upon investigation he found the other furnace in this boiler in the same condition. The fires were at once hauled out, and upon examination it was found that the furnaces were down 21 inches, the corrugations being pulled out so that at the bottom of the bulges the furnace was almost smooth; but no sign of fracture could be discovered.

If these furnaces had been poorly made, or if they had been constructed of a material deficient in ductility, it is almost certain that a disastrous explosion would have followed the rough usage to which they were subjected; and this fact ought to satisfy anyone of the paramount importance in boiler construction of having good material and good workmanship. The unwisdom of giving a fireman too many things to remember will also be apparent; for if the boiler had been provided with its own separate blow-pipe, discharging directly into the sea without any connection with the other boilers, this accident could not have happened.

Bolthoff Combined Noiseless Gear and Friction Hoist.

The new hoist herewith illustrated is made by the Hendrie & Bolthoff M'f'g Co., Denver, Colo., who say: "It is an acknowledged fact that the only serious objection to the older pattern of geared hoists is the noise caused by gears or pinions when attempting to operate at high speeds." They claim that by the introduction of their new patent noiseless gear and pinion they have reduced this to a minimum, and, combined with their friction hoist, have produced a machine which effects a saving of 33 per cent in steam and a consequent reduction in the fuel bill, safety to employes insured by a greatly improved brake, a durable machine. By the method of construction employed in this hoist it is impossible to spring the drum shaft. Standard sizes are as follows: 6x8, 7x10, 9x10, 10x12 and 12x12.



BOLTHOFF COMBINED NOISELESS GEAR AND FRICTION HOIST.

All their hoists are equipped with a Bolthoff balanced register throttle valve, by which the steam can be shut off instantly if occasion requires. The valve is perfectly balanced, and is provided with a screw to take up the wear. No packing is required.

Scientific Progress.

Proposed Polar Exploration.

Three incidents in Polar exploration of much more than ordinary significance have occurred within the last few days, says the Brooklyn *Eagle*. The public and formal indorsement by the American Geographical Society of Civil Engineer Peary's plan for an expedition to reach the North Pole, marks an advance in the development of the project and brings it within the reach of actualities. With the approval of this most authoritative and influential body of scientists and geographers, Mr. Peary's project has the recognized standing, which is essential as a base of operations, and upon which the efforts for the ways and means may be organized. The value of the moral support of the society is indeed greater than the financial, and, with this secured to the project, the systematic and vigorous effort among the individual members of the society will be likely to advance to definite form and purpose the project which promises so much to science and to America.

Scarcely less important is the report that the English Government, upon the recommendation of Mr. Goschen, first lord of the admiralty, is in favor of appropriating to the Antarctic expedition $80,000, which not only commits the English Government to a serious and persistent effort in the unknown and unexplored continental areas to the south, but, in the judgment of the London papers, indicates a conviction on the part of the Cabinet that peace for at least three years is certain. Dr. John Murray, upon whose recommendation Mr. Goschen has acted, asked for two ships for three years, with a maximum complement of 300 officers and men. Dr. Murray says that the expedition will spend the first summer in sounding the whole Antarctic ocean south of latitude 60, by which definite knowledge of the contour lines of the ocean's bottom may be obtained, and that a landing party, which would probably travel in a short time over the inland ice to the South Pole, should be put ashore. Whether there is any foundation for the report that Nansen, the Norwegian, is to head the expedition, is not known.

The third incident of interest in the Polar field is the grant by King Oscar, of Norway and Sweden, of a gunboat to convey Andree's balloon equipment to his Spitzbergen headquarters, and his request to the authorities of all northern and sub-Arctic posts and stations to inform the natives that the balloon and the explorers may be expected to drop among them at any time after July 1. A similar notification was sent out last year, but, as will be remembered, no one was seriously alarmed by the appearance or the arrival of the aerial party.

DISCUSSING, several years ago, the economic element in technical education, Prof. L. S. Randolph remarked that no more exasperating thing can occur to the young graduate leaving college, with his brain filled with thermodynamics, neutral axes, radii of gyration and the like, than to be asked the price of a six-penny pulley and to have no idea of the answer, nor to know where to get the information. The condition which prompted this statement is as much in evidence today as it was at that time. Business training is sadly neglected in the preparation of the engineering student for practical work in later days, and he should make good use, therefore, of any available opportunity afterward to acquire his training, partially at least, by actual contact with business methods. Engineering success to-day demands business faculties at ready command.

Electrical Progress.

Experimental Railroad Work.

The trend taken by the electric railway industry in the direction of the field hitherto occupied exclusively by the steam locomotive, as evinced by the recent developments on the New York, New Haven & Hartford and Baltimore & Ohio railroads, has caused the General Electric Company to provide itself with its own special line of track, upon which to carry out electrical traction experiments. Beginning with the early motors of Vandepoele and Sprague, and following along the lines of those built for interurban service, elevated, suburban and branch steam lines, and reaching the huge 360 H. P. motors giving a drawbar pull of 60,000 pounds on the great electric engines on the Baltimore & Ohio Railway, the next step is the development, along lines already indicated, of some feasible method of electric traction which can be adapted to long distance railroads, efficiently and economically, and, therefore, commercially.



FIG. 1.—MOTOR CAR WITH FOUR LOADED FREIGHT CARS.

The line of track built by the General Electric Company lies between the works at Schenectady, N. Y., and the Erie canal. It is 6700 feet long, of the regulation railroad construction, the service rails being standard rails 85 pounds to the yard.

The track rises on a gradient of 4 per cent to the level of the heel path. The first section of the line is a tangent 2415 feet long, the second a series of short tangents and curves 1635 feet long, and the third another tangent 2730 feet in length. Running beside the track on the far side from the canal are conductor rails. Of these there are two running, parallel with each other and the track, from the top of the first gradient to the end of the line. They are 30-pound rails, set on 8-inch ash blocks treated with bergtheer in vacuum pans and thoroughly impregnated. The two sets of conductor rails have been laid down for the purpose of experiment with alternating multiphase currents. For direct current experiments two rails are connected in multiple. Both service and conductor rails are bonded with 0000 copper bonds. The current is taken from the works power house over a line issuing from the back of the testing department. The feeder is a 500,000 c. m. insulated cable, running by the track for a distance of about 5300 feet. The line is divided into three working sections, each controlled by its own switch and semaphore. When this switch is closed its section of conductor is made alive, and the movement of the switch handle sets the semaphore. The experiments made so far have been carried on for the purpose of developing motors and systems of operation for elevated and surface seam roads. For locomotive a special eight-wheeled car is used. This resembles a regular passenger coach so constructed as to give an unobstructed access to the two motor trucks. The weight of this coach-locomotive, equipped, is 30 tons, empty. It is divided into three sections—a driving and testing department in front, a passenger division in the center, and a rear compartment in which are carried the air pump, tools, etc.



FIG. 2.—MOTOR CAR WITH FOUR N. Y. C. & H. R. PASSENGER COACHES WITH TROLLEY USED FOR MOVING THE CARS AROUND THE YARDS WHERE THE THIRD RAIL IS NOT LAID.



FIG. 3.—VIEW OF TRACK SHOWING THIRD RAILS.

The equipment of the forward compartment consists of a skeleton wooden switchboard carrying the ammeters, voltmeters, wattmeters, etc., to enable the engineer to gauge exactly and record the performance of the specific motor equipment which may be under experiment at any stated time. In addition the switchboard is fitted with the necessary quick break switches, magnetic blow-out, fuse boxes, automatic circuit breakers, etc. The controller is set in front of the right forward front window, through which the driving engineer has an unobstructed view of the track in front of him. To his right is the valve handle of the air brake, and in front of him is an operating ammeter gauging the current output. The resistances are suspended from beneath the central compartment.

In the test during which the photographs from which our illustrations were made the equipment of the car consisted of four General Electric 2000 motors—each motor being rated at about 125 H. P.—one motor to each axle, motion being communicated to the wheels through steel gear and pinion. The forward truck was equipped with a special speed recorder. The controller used was a K 16 series parallel controller.

From beneath the bolster of each truck, set between the wheels on the conductor rails' side, projects a heavy oaken beam, to which is suspended the contact shoe by means of which the current is brought from rails to motors. This shoe is a flat piece of cast iron, with the ends slightly curved. It is fastened by two loose links to an iron casting bolted to the oak beam. This method of suspension keeps the shoe continuously in contact with the surface of the conductor rail, as it allows it to conform immediately to any inequalities which may occur in the latter.

The air for the brakes and whistle, one of which is set at each end of the car, is furnished by a vertical direct connected air pump, operated by a motor controlled automatically. This automatic action is brought about by the balancing of the pressure in the tanks against the power of a spiral spring. The spring is coiled in a cylinder furnished with a piston, the upper end of which is a switch in a magnetic blow-out device. As soon as the pressure in the main tank falls below the desired pounds per square inch the spring forces up the piston until its upper end is in contact at the switch. Contact being made, the motor circuit is closed and the air pump motor starts. As soon as the pressure rises to normal the piston is forced back, the circuit is broken and the motor stops any arc at the point of rupture of contact, being immediately extinguished in the magnetic field of the blow-out device.

The first test made with the motor equipment, the total drawbar pull of which is about 15,000 pounds, consisted in the hauling of four flat cars, each loaded with pigs of iron. This load, about 121 tons dead weight, was easily handled by the locomotive, and the records as to speed and power required showed gratifying results.

The locomotive was then coupled to four standard passenger coaches, making, with the motor car, a train of 130 tons. The controller was in charge of Chief Engineer W. B. Potter, and S. H. Libby acted as conductor. Several interesting runs were made with this train up and down the track, with equally encouraging results.

Our illustration (Fig. 2) of the latter test is made from a snap shot photograph taken as the train was rushing past the first semaphore at a speed of about forty miles an hour. Fig. 3, made with the train at rest, shows the construction of the track, the method of laying the conductor rails and the semaphore with its switchbox.

Mechanical Progress.

H. P. of a Steam Boiler.

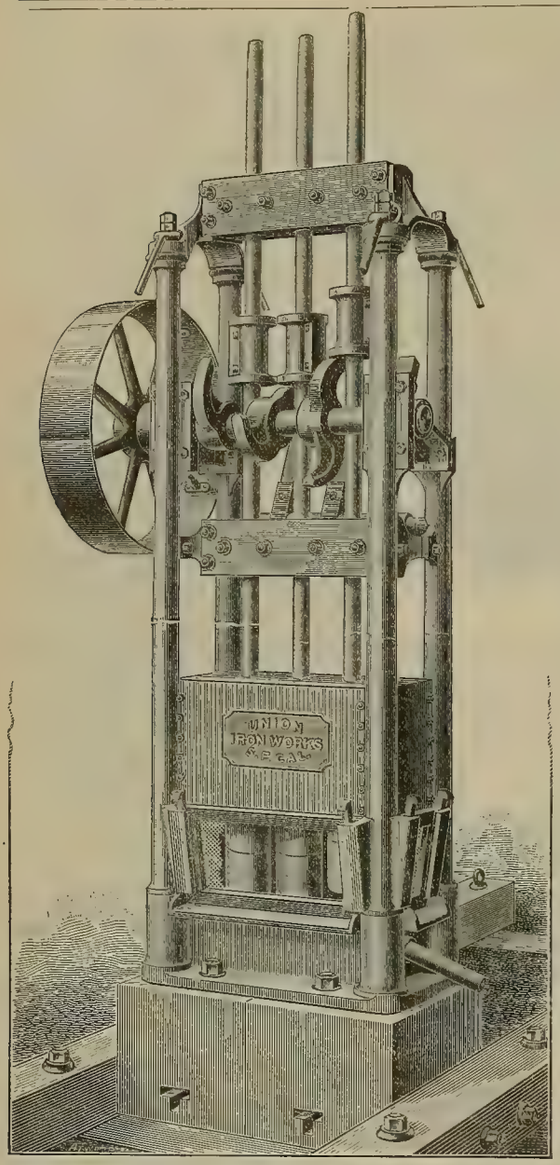
Rule: To find the H. P. generated in any kind of a boiler when running, first, notice how long it will take to evaporate 1″ of water in the glass gauge, divide this into 60, which gives number of inches evaporated in one hour; second, multiply the average diameter where evaporation took place by the length of the boiler in inches; this multiplied by the number of inches evaporated and the answer divided by .1728 gives the cubic feet of water evaporated in one hour.

There is no such thing as a H. P. to a steam boiler—it is a measure applicable only to dynamic effect; but as boilers are necessary to drive steam engines the same measure applied to steam engines is now universally applied to the boiler.

The standard as fixed is one cubic foot of water evaporated per hour from and at 212 degrees. For such H. P. this at that time was the requirement of the best engine in use. At the Centennial Exposition, in 1876, a board of engineers selected from all parts of the world adopted as a standard for tests of boilers 30 pounds of water evaporated per hour under a steam pressure of 70 pounds per square inch as representing one boiler H. P. The general rule in estimating H. P. of boilers is based on its evaporating one cubic foot of water per H. P. per hour one foot, or 62½ pounds, or $\frac{5}{8}$ gallons of water evaporated per hour is equivalent to one H. P.; that is, a boiler that will evaporate ten cubic feet of water, 625 pounds of water, or 62½ gallons of water per hour is a boiler of 10 H. P.

It is claimed that cast iron may be used for dressing or finishing wrought iron, cast iron or brass. It is said that an Eastern shop is using cast iron lathes for this purpose. It is a fact, however, that cast iron can to a certain extent be tempered by chilling. Being thus made harder, it bears the same relation to cast iron, which is comparatively soft, that one grade of steel does to another. It has been found that tools cast of a chilling mixture, with that part of the tool which performs the work chilled, will work better than the same tools made of steel—at least, the shop making a practice of employing them finds that the workmen prefer them, which in itself is a recommendation that would not be given without being backed up with reason. As many of our foundries are operated in connection with machine shops, it would take but a small outlay to test the claims of the efficiency of cast iron for this purpose.

An arrangement of fast and loose pulleys that is being used with some favor consists in cutting a number of grooves obliquely on the surface of the fast pulley, about 3 inches in length, running from that side nearest the loose pulley and terminating about the middle by a gradual diminution in the depth and width of the cuts. These grooves, which are cut about 1½ inches apart and in the direction in which the belt runs, have the effect of taking hold of the belt immediately it leaves the loose pulley, and, in wormlike fashion, draw it onto the whole surface of the fast pulley, thus relieving the belts at once from the pressure of the guide fork, and causing the pulley to be immediately gripped and started without delay. Where there is much belt shipping to do, as on mules, planers, etc., there is claimed an increased output of about 5 per cent and a saving in wear of belts.



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WAS MADE BY THE

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The stamps weigh 350 lbs.

The total weight of the battery is 5000 lbs.

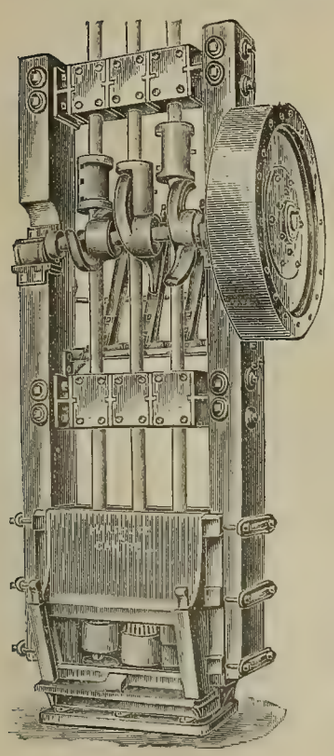
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Saves bill for heavy timbers, millwright and mechanics' labor, and a large amount of space. The term self-contained means a great deal for the mine owner, and can be readily recognized and appreciated in making an estimate for an ordinary plant when the comparative cost is considered.

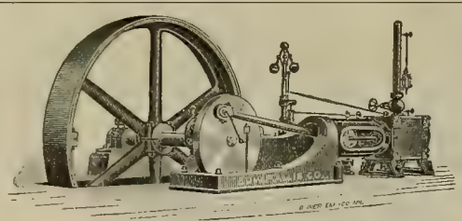
FIRST: There is saved a large bill for heavy timbers, in many instances obtained at great expense and loss of time.

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THIRD: The large amount of space saved.

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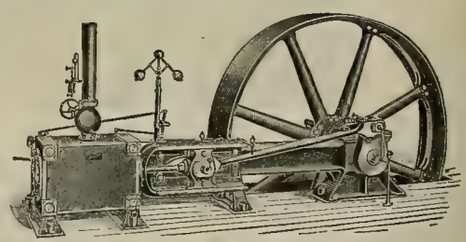
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Genuine English Pump Leather

For Heavy Mining Pump Buckets. Will outwear any other material and give best satisfaction. Samples furnished on application. A. C. NICHOLS & CO., Leather Manufacturers and Dealers, 404 Battery St., S. F.

Coast Industrial Notes.

—Work on the Sierra Railway from Oakdale to Sonora, Tuolumne Co., Cal., is progressing rapidly. Over two miles of track has been laid.

—At Los Angeles, Cal., the question of refunding the bonded indebtedness of the city, amounting to $270,600, was settled last Saturday by a vote in favor of the proposition.

—The preliminary survey for a narrow-gauge railroad from Ukiah, Cal., to the head of the Navarro river has been completed. The road is to be built by local capital, and will penetrate the redwood belt on the coast. It will be about twenty-five miles long.

—Minister Baker, representing the United States at Managua, Nicaragua, has been instructed by the State Department to take such steps as may seem advisable to prevent the forfeiture of the Nicaraguan canal concession by the Government to which he is accredited.

—There are planted for the Chino sugar factory at Chino, Cal., about 4000 acres of beets, of which 1200 are on the Chino ranch, 2000 acres about Anaheim and 170 acres in Ventura county. Anaheim has 1500 acres yet to plant, making a total of 4100 acres to be devoted to the crop there.

—A new fish hatchery, for which the supervisors of Mendocino county contributed $750, has been completed at Ukiah. Eggs will be received at the new hatchery from Lake Tahoe April 15th. The product from the local hatchery will be used for stocking streams in Mendocino, Sonoma and Marin counties.

—The first steamer bound for Mexico under the terms of the agreement made with the Pacific Coast Steamship Company will leave San Francisco April 25th and touch at San Pedro for her cargo April 27th. The steamer will touch at San Pedro both going and returning, thus opening free trade relations between southern California and Mexico.

—The orange season for southern California is about closed. Thus far 4700 carloads of oranges have gone to market, and it is believed there are about 250 more carloads of navel oranges and 500 cars of other varieties. The crop was variously estimated last December from 7000 to 8000 carloads, so it will be seen that the estimates were from 500 to 1000 carloads too high.

—The Nevada County Narrow Gauge Railroad, Grass Valley, Cal., during the past year, earned $25,341.35 in excess of its expenses, paid $10,000 of its bonded indebtedness, and proposes to reduce the fare about July 1st. J. F. Kidder is president and manager; P. Johnston, vice-president; G. Fletcher, secretary and auditor; E. H. Brown, treasurer and superintendent.

—The Shasta Lumber Company was sold under foreclosure of mortgage at San Jose, Cal., last week, for $87,000. The property in Shasta county includes 35,000 acres of fine timber land in the Sierra, a thirty-mile flume that cost $150,000, twenty-two miles of railroad connecting with the Southern Pacific, sawmills, etc. It was mortgaged for $360,000, and was locally estimated to be worth a million dollars.

—The celery harvest in the peat lands west of Santa Ana, Cal., is concluded. There have been 250 carloads, or ten trainloads of twenty-five cars each. The celery is conservatively valued at $1500 per car, which would make the total output sent East represent $375,000. This amount of money represents only what was shipped East. The growing of celery for the winter markets of the East was begun only four years ago.

—In San Diego county, Cal., the Lower Otay dam will soon be completed. It is the first to be completed of four large rock-filled dams in process of construction by the Southern California Water Company. All are within sixty miles of San Diego and the system when completed will have cost $3,000,000 and will be capable of irrigating 100,000 acres of mesa lands in the county. One hundred and fifty men are now employed.

Recent California Mining Incorporations.

Jenny Lind Mining Company, San Francisco; capital stock, $1,000,000, all subscribed; C. D. and T. T. Lane, Angels Camp; L. W. Shinn, San Francisco; A. Hayward, H. G. Stevenson, San Mateo.

Karma Mining Co., San Francisco; Jno. M. Wright, D. E. Hayes, R. H. Turner, W. E. Thompson, J. W. Lancaster; capital stock $100,000, $50 subscribed.

Big Ledge Mining Co., San Bernardino, Cal.; M. Peacock, W. and S. Thies, Los Angeles, C. B. Morris, San Bernardino; capital stock $100,000, $21,040 subscribed.

Recently Declared Mining Dividends.

Gwin mine, Calaveras Co., Cal., $6000, payable immediately.

Portland Mining Company, Cripple Creek, Colo., $30,000; payable April 15th.

WANTED.

Position as Prospector or Mining Engineer for New Mining Company.

First-class assayer, millman, miner and cyanider. Eighteen years' experience in coast mines. Bonds furnished if desired. Address L, Mining and Scientific Press Office.

An Experienced Millman desires position in a mill. Has had several years' experience in different parts of California. Understands concentrators. Good reference given if required. Address "Millman," Mining and Scientific Press.

Personal.

HON. E. C. VOORHIES of Amador is a candidate for the San Francisco superintendency of the Mint.

WILLIS KNAPP has been elected superintendent of the Orient Mining Company at Tintic, Utah.

ALEXANDER BURRELL has been appointed manager of the Montana Mining Company (the Drum Lummond).

J. H. MEANS of the State Mining Bureau is making an extended study of the geological formation of Randsburg, Kern Co., Cal.

EDWARD KENT, who was for four years chief engineer for the Anaconda Company at Butte, Montana, has taken the same position with the Boston & Montana Company.

MARK ELLIOTT, a Santa Rosa, Cal., mining engineer, recently reported dead in Mashonaland, South Africa, has returned from that region after a five years' absence. He proposes to return next October.

ALEXANDER HILL, manager of the Mountain Copper Company, Limited, of Shasta county, Cal., has resigned and will take hold of some large enterprises in the same county on account of himself and some Eastern associates.

WILLIAM BAILEY, president, and O. P. Posey, general manager, of the Tomboy mine at Telluride, Colorado, were in San Francisco last week, where they made the formal transfer of 51 per cent of the stock and control of that property to representatives of the Exploration Company of London, which has purchased it.

CAPT. C. E. GILLETTE of the U. S. Debris Commission has returned from the southern part of the State, and, in company with Col. C. R. Suter and Lieut. C. E. L. B. Davis—the two other members of the commission—has been the past week viewing De Guerre point, Smartville and other points on the Yuba, Feather and Sacramento rivers, where restraining barriers are deemed feasible. The appropriation is now available, and as soon as the commissioners shall decide where construction shall begin, actual operations will commence.

PROF. LEWIS SWIFT of Echo Mountain Observatory, Los Angeles county, California, has received from the Royal Astronomical Society of England the Jackson-Gwilt gift, which consists of an interest in the invested capital and a bronze medal. This is the first time the Jackson-Gwilt gift has been awarded. The Herschel medal, which accompanies the letter, is of bronze, bearing on one side the inscription: "William Herschel, MDCCXXXVIII-MDCCCXXII," surrounding a bas-relief of the great astronomer. On the reverse side is a graceful female figure supporting a globe and surrounded by the planetary system, with the inscription: "Royal Astronomical Society, Jackson-Gwilt Gift." On the rim of the medal is inscribed: "Lewis Swift, 1897." Prof. Swift has discovered nearly 1000 nebulæ and comets. Nine medals and two cash prizes have been awarded to him for his discoveries.

British Columbia.

W. J. R. COWELL, B.A., F.G.S., Mining Engineer, Reports on mines, designs and superintends the erection of mining and milling machinery; makes analyses of ores, metals, soils, etc.; arranges for mill tests, and selects suitable processes for the treatment of ores. Correspondence invited. Address W. J. R. COWELL, Victoria, B. C.

British Columbia.

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Has prospects for sale in Trail Creek and the whole of the Columbia basin. Will buy legitimate stock and mines for investors. Will examine mines. Has lots for sale in Trail and Deer Park.

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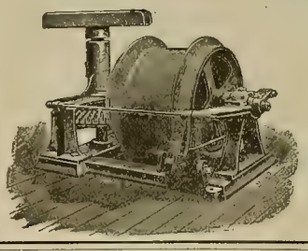
These wheels are durable, highly efficient, and are the only wheels which have perfect regulation, which feature makes them especially suitable for the operation of electric machinery.

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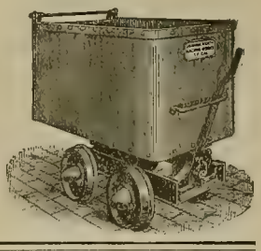
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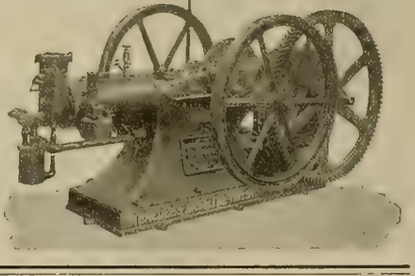
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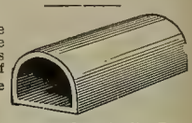
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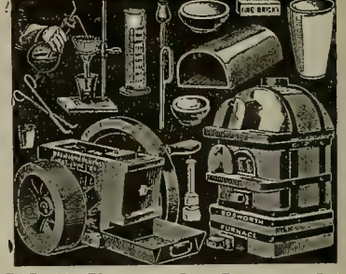


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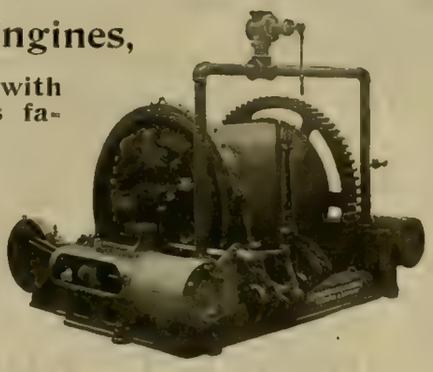
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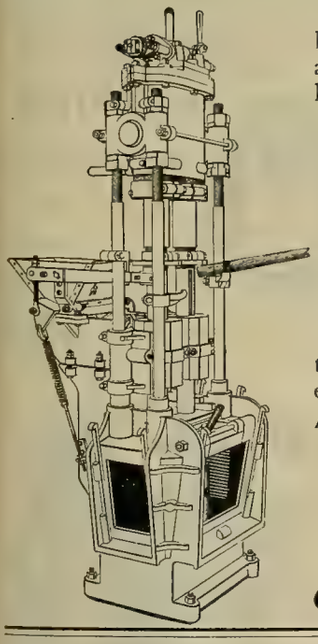
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List of U. S. Patents for Pacific Coast Inventors.

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FOR THE WEEK ENDING APRIL 6, 1897.

580,077.—PHOTO PLATE HOLDER—M. Anderson, Northport, Wash.
580,262.—STAIRWAY AND FIRE ESCAPE—G. H. Dyer, S. F.
580,269.—DREDGING APPARATUS—P. J. Gildea, S.F.
580,271.—BICYCLE BRAKE—A. N. Godfrey, Port Townsend, Wash
580,084.—WATER PIPE JOINT—H. H. Gorter, S. F.
580,282.—TOUCH REGULATOR—R. F. Hornung, Oakland, Cal.
580,215.—STOVE—R. P. McKay, Portland, Or.
580,193.—BOX COVER—Mary McRae, Everett, Wash.
580,142.—HOSE NOZZLE—Neilsen & Krauth, Alameda, Cal.
580,217.—HOT AIR CABINET—W. H. Peirce, S. F.
580,226.—PIPE TUNNEL—E. F. Sanford, Merced, Cal.
580,229.—FRUIT SLICER—S. H. Shelley, Berryessa, Cal
580,232.—HARNESS HANGER—E. P. Smith, S. F.
580,073.—WAVE POWER—Williams & Tuller, S. F.
580,030.—CONCENTRATOR—Geo. E. Woodbury, S. F

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FRUIT SLICING MACHINE.—S. H. Shelley, Berryessa, Cal. No. 580,229. Dated April 6, 1897. This invention relates to a machine which is especially designed to slice fruit, preparatory to its being canned, dried, preserved, or put up in other ways. It consists essentially of a series of rotary cutters, the blades of which stand in radial planes, so that the edges of the cutters converge and stand closely together; a mechanism by which each of the cutters is rotated in its plane; a means for passing the fruit beneath and between the converging edges of the cutters, and a yielding surface beneath the cutters for receiving the fruit and holding it up into contact with the cutters as it passes. In conjunction with the carrier upon which the fruit is conveyed is an intermediate carrier extending between the main ones and slightly above the level thereof, whereby the central portion of the fruit is prevented from sinking between the main carriers.

SUBAQUEOUS PIPE-TUNNELS.—Edgar F. Sanford, Merced, Cal. No. 580,226. Dated April 6, 1897. This invention relates to the class of pipe-tunnels or conduits for any purpose, such the conveying of liquids or gases, or the transportation of messages and goods, or the passage of vehicles, such tunnels being laid under water to rest upon or in the bottom. It consists essentially of flexibly jointed sections; a continuous flexible line secured to each section and crossing the joint so as to connect them together; coupling sections telescoped in the adjacent ends of the main section, and of sufficiently smaller diameter to permit the main sections to bend out of line; bands of flexible waterproof material encircling the joints exteriorly, and fastenings on the main sections consisting of fixed and movable jaws which engage the continuous cable which flexibly connects the sections together. In conjunction with these are controllable nozzles in each section with pipes leading thereto, whereby water may be introduced and ejected against the bottom so as to adjust and grade the line of the tunnel or conduit.

TOUCH REGULATOR FOR KEYED INSTRUMENTS. Rudolph F. Hornung, Oakland, Cal. No. 580,282. Dated April 6, 1897. This invention relates to a novel means for arranging and mounting the touch-regulating mechanism, to cause it to exert varying degrees of pressure and vary the touch of the keys to suit individual performers. It consists essentially in the combination of a pivotally mounted bar; a series of coiled springs secured thereto, having their free ends so disposed as to contact with a part of the action of the instrument; a crank arm depending from the pivot bar; a rachet bar having side flanges provided with inturned lower edges, and a rod connected with the crank arm, having a pawl at its free end adapted to engage the rachet bar and to slide freely between the side flanges. By means of an interposed rocking bar the pawl may be moved with relation to the ratchet so as to increase or decrease the tension of the springs.

COLLAPSIBLE TELESCOPIC HOT AIR CABINET. Wm. H. Pierce, San Francisco, Cal. No. 580,217. Dated April 6, 1897. This invention relates to an adjustable cabinet which is specially designed for the purpose of hot-air bathing and treating. The object is to provide a cabinet which may be made to form an enclosed chamber within which the person is seated for the purpose of applying a hot-air bath, the chamber being adjustable for different heights, and made to be taken to pieces and folded up by means of telescoping framework. It consists essentially of tubular corner posts, other corner posts adapted to be slidably fitted to the first named ones, means connected with one set of posts engaging with the posts of the other set to vertically adjust the height of the cabinet, sockets on the stationary posts and transverse connecting bars having their opposite ends bent to detachably engage said sockets, an exterior flexible covering for the cabinet and devices for securing the corners or angles to both sets of corner posts, said covering having a neck opening and a flexible front with means for closing and uniting the same.

ADJUSTABLE STAIRWAYS AND FIRE ESCAPES.—G. H. Dyer, San Francisco, Cal. No. 580,262. Dated April 6, 1897. This invention relates to improvements in stairways whereby the direction of the exit and entrance at the opposite ends may be regulated to suit the points where the landings are located. The object is also to provide a simple and easily adjustable means for building spiral and other stairs without any necessity of laying out each set of stairs to suit the particular location. It consists essentially of a step support with collars and means whereby they are adjustably clamped upon the support, said collars having supporting lugs, segmental tread plates having horizontal, flat-faced inner ends fitting and secured upon the lugs and standards by which the outer ends of the steps are adjustably connected and supported. The peripheries of the steps have a series of perforations so that the standards may be connected with two or more steps and secured thereto.

MINING DREDGING APPARATUS.—Peter J. Gildea, San Francisco, Cal. No. 580,269. Dated April 6, 1807. This invention relates to that class of dredgers in which a suction pump is employed to raise the material. It is especially designed to be used in mining operations to raise to the surface material from which the precious metals may be separated or extracted, and has for its object a means for stirring and loosening up the material at the bottom, at the same time preventing the clogging up of the suction pipe. The screen chamber enclosing the mouth of the suction pipe has holes in the lower side and reciprocating pieces operating through the holes to keep them clear; these pieces also projecting, so that they are adapted to loosen up the material beneath. The screen box is rotated so that the longitudinally slidable rods are moved in and out through the holes in it, and a means operated by the rotation of the exterior pipe and box which acts to move or reciprocate the said rods. In order to dispose of the larger rocks and pieces, I employ an endless traveling carrier with teeth and guide extensions, which act to carry away these larger rocks or pieces. The tank forms a part of the suction channel having communication therewith and a screen, so that the material is separated from the water by said screen and falls into a receiving box beneath.

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Caveats filed, assignments duly prepared, examinations made, and a general Patent Agency business conducted.

Established and successfully and popularly conducted for nearly thirty years, our patrons number many thousands, to whom we refer with confidence, as men of influence and reliability. Old and new inventors are cordially offered the complimentary use of our library and free advice, etc. No other agency can afford Pacific States inventors half the advantages possessed by this old, well-tried and experienced firm.

For Sale at a Bargain.

One new GOLD KING AMALGAMATOR—never used. Apply to Marshutz & Cantrell, N. W. corner Main and Howard streets, San Francisco, California.

The General Gold Extracting Co., Ltd.,

PELATAN-CLERICI PROCESS.

Patented in U. S. and Other Countries. Capital, £100,000.

London Head Office.....8 Drapers Gardens.

Laboratory and Ore Testing Plant, 1530 Wynkoop St., Denver, Colo.

This process has a well-demonstrated merit in treatment of low-grade Gold and Silver Ores, especially those of a complex character, talcose and clayey combinations or slimes, which class of ore, as is well known, cannot be treated by leaching or lixiviation.

Gold and silver values, both fine and coarse particles, are by the PELATAN-CLERICI PROCESS recovered direct from ore without roasting as pure amalgam, and the precious metals are saved in the form of fine bullion without any refining costs.

F. CLERICI, Manager for U. S.

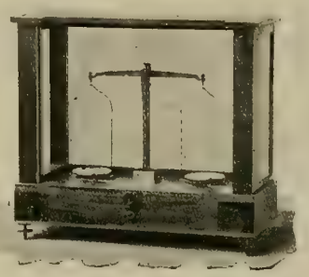
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Special attention given to preparing plans for the Chlorination and Bromine Processes of Treating Gold Ores.

PATENTEE { **Brown's Complete Automatic Mill Process.** **Brown's System of Mechanically Stirred Roasting, Cooling and Conveying Furnaces, Etc.**

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SENSIBLE TO 1-2 MILLIGRAMME.

For weighing the pulp or ore charge for assaying. This balance also makes an extremely accurate diamond or prescription scale.

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QUARTZ SCREENS

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The Original Cyanide Process.

SIMPLE. RELIABLE. ECONOMICAL.

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Gold Medal, Columbian Exposition, 1893.

MINE OWNERS and others having Refractory and Low Grade Gold and Silver Ores and Tailings should have their material tested by

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And other Chemicals for Mining Purposes.

POWELL'S RE-GRINDING STAR VALVE



A Valve that Shuts Steam Off TIGHT.

Full particulars by addressing the manufacturers,

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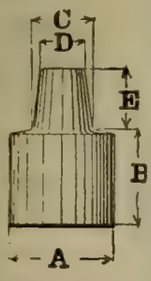
CINCINNATI, O.

Puget Sound Machinery Depot, Seattle, Wash., carry a stock.

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Office and Works: Cor. Beale and Howard Streets, San Francisco, Cal.

MINERS, ATTENTION!



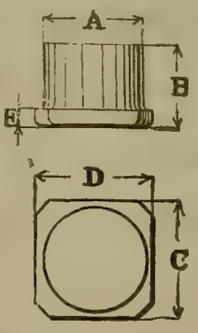
A=.....inches.
B=..... "
C=..... "
D=..... "
E=..... "

We beg to call attention to our "RISDON HAMMERED" Shoes and Dies, which are made of a special quality of steel, are hammered and then compressed in moulds so as to give the greatest possible density.

These Shoes will outlast any other make and will not chip or cup.

We have attached a sketch showing sizes; fill in the size of your Shoes and Dies, and order a trial set.

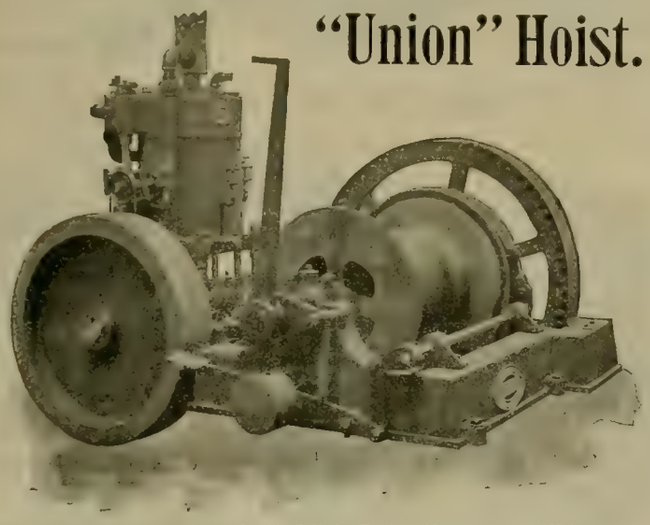
Our prices are as low as any, and the article we offer should commend it to all mine owners and mill men.



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"Union" Hoist.



The above cut represents our 10 h. p. Double Cylinder Engine of latest type, and Hoist combined on strong iron base. This hoist is designed to raise one ton 125 feet per minute from an inclined shaft, or 1500 pounds at the same speed vertical lift. The drum will hold over 600 feet of ⅝-inch cable. The outfit weighs 3500 pounds.

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"Union" Gas Engines,

Which use either Manufactured or Natural Gas, Ordinary Stove Gasoline (Naphtha or Benzine), Distillate or Kerosene.

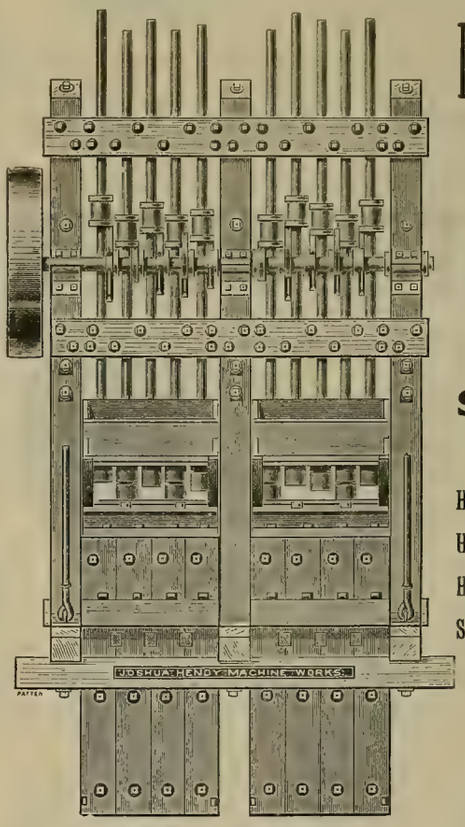
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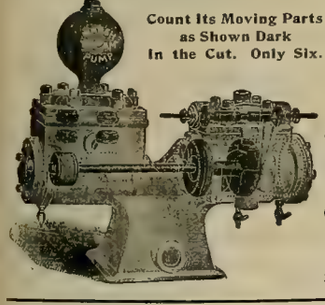
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Maximum of Strength, Simplicity and Service.
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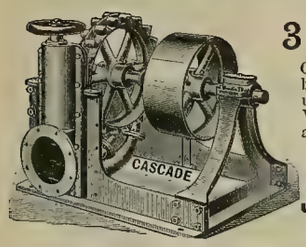
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Adapted to all Heads from

3 Feet to 2000 Feet.



Our experience of 33 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

Send for a Pamphlet of either Wheel and write full particulars.



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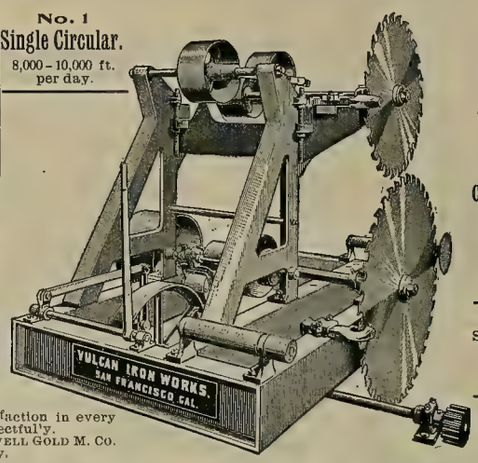
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A. T. CORBUS, Sec'y.

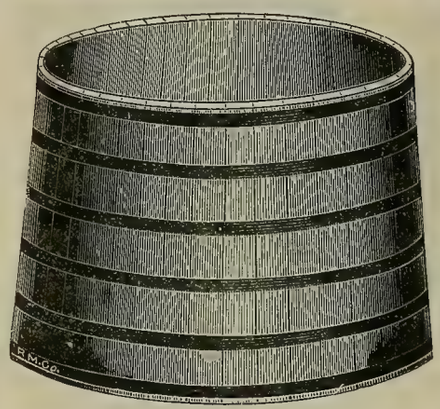
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The Best Tank ON THE MARKET

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TWENTY-EIGHT YEARS' CONTINUOUS SERVICE in the great Mines, Steamships, Railroads and Mills all over the world prove it to be

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These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for Illustrated Circular.

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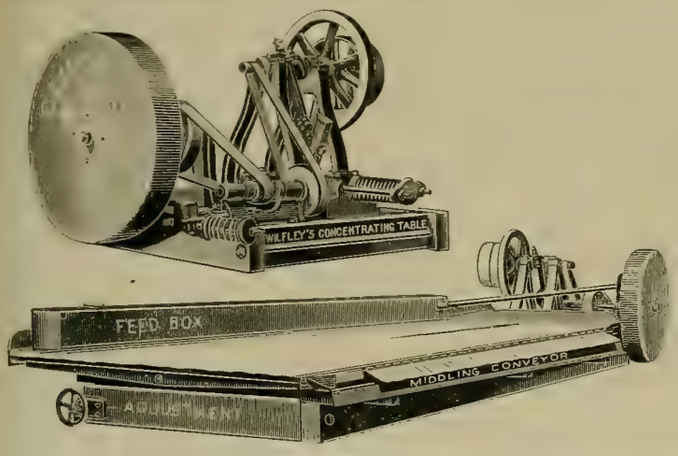
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Wilfley Concentrating Table,

And claim for it BETTER work than any Concentrator made, with a capacity of from 15 to 25 tons per day of 24 hours. It is simplicity itself. No moving belts or intricate parts. Anyone can learn to operate in an hour.

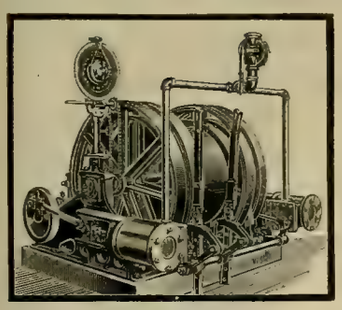
For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Col.; M. E. Smith Concentrator, Golden, Col.; Mary Murphy Mine, St. Elmo, Col.; W. E. Renshaw, Mayflower Mill, Idaho Springs, Col.; W. H. Bellows, Boyd Mill, Boulder, Col.; H. E. Woods, Denver, Col.

ROMLEY, COLO., Jan. 19, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Answering yours of the 5th inst., would state that after a thorough trial we have discarded seven Woodbury Tables and two Johnsons and adopted the Wilfley Concentrating Table, which we think up to date is the best table in the market, so far as our knowledge is concerned. Yours very truly, [SIGNED] B. B. MORLEY, M'g'r Golf M. & M. Co.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

PRICE, $450.00.



Mine Managers Are Known by the Machinery They Use.

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Denver is the Paris of the Mining World!

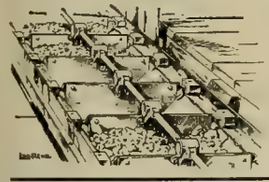
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We Manufacture and Carry in Stock the Most Complete Line of STEAM and ELECTRIC HOISTING ENGINES Made, Consisting of Quadruple Flat Friction, Geared, Combined Gear and Friction. Direct Motion Improved Challenge Ore Feeder, without Gears or Clutches. Improved Balance Throttle Valve. Improved Mortar for Stamp Mill, Especially Designed for Gold Ores.

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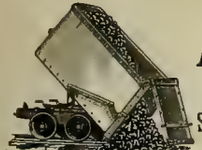
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MODERN METHODS as applied to the handling of Freight, Grain, Ores, Raw and Manufactured Products.

MALLEABLE IRON BUCKETS, Approved Pattern and Weight; ROPE POWER TRANSMISSIONS, SHAFTING, PULLEYS, GEARING, CLUTCHES, ETC.; ELECTRIC COAL MINING MACHINERY.

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TRUAX Patent Improved

Automatic Ore Cars.

THEY ARE THE BEST AND CHEAPEST.



SCHAW, INGRAM, BATCHER & CO., AGENTS,

Pat. Jan. 5, '92, Aug. 27, '95. *Send for Catalogue.* Sacramento, California.

Riveted Steel Water Pipe.

THE WEIGELE PIPE WORKS,

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TUTTHILL WATER WHEEL.

The Latest and Best Jet Wheel in the Market, BARRING NONE.

Wheels Buckets and Nozzles Designed to Suit Special Requirements. When Head and Conditions Are Given.

Theoretically as Well as Practically Perfect. Highest Efficiency Guaranteed.

CONTRACTS TAKEN FOR ANY SIZE PLANT.

We have a Sensitive, Simple and Durable Governor, entirely new and novel, that will positively regulate speed of wheel. Specially adapted for electric railway and lighting plants.

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OAKLAND IRON WORKS, Builders.

108 FIRST STREET, SAN FRANCISCO. Telephone 1007 Main.



To Gold Miners!

Silver Plated Copper Amalgamating Plates

For Saving Gold in Quartz and Placer Mining.

Every Description of Mining Plates Made.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES REPLATED. TWENTY-SIX MEDALS AWARDED. GOLD, SILVER, NICKEL, COPPER & BRASS PLATING.

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E. G. DENNISTON, - - - - - - - - - - Proprietor.

Telephone, Main 5931. Send for Circular.

Market Reports.

The Markets.

SAN FRANCISCO, April 15, 1897.

The trade reports increasing orders, with the buying as a rule in larger quantities, which is quite a radical departure from what has been a characterizing feature of their purchases for a long time past. This is accepted as a growing feeling of confidence, inspired by the belief that prices are low, crops will be large, that a gold mining boom is at hand and there will be a revival in speculation before the summer months pass. The activity reported in railroad car shops, new lines being built, with contemplated improvements in other directions, are an incentive to trade. It is said that more buildings will be erected in interior towns and cities than for several years past. Manufacturers continue to report increasing orders, with the majority adding more help. At this writing the outlook is quite promising.

The local money market is reported practically unchanged. The banks accommodate regular customers to a larger extent than at any time last year, while those with gilt-edge security have no difficulty in getting shaded rates of discount. Collections are reported by jobbers as fairly easy, with accounts not so large as has been the practice. In the absence of a liberal supply of Eastern and foreign bills the premium on New York exchange holds to strong figures. New York advices state that the money market is still dull, with the rates of discount from 1½ to 2 per cent, with the bulk of transactions from 1¼ to 1¾. The supply of commercial paper is light. The sterling exchange loans have been reduced to below $5,000,000, which causes some to believe that gold exporting will be the order before long, in the absence of any large export movement of American products and free imports of foreign. Even if this does take place it will not have much effect, owing to the large gold reserve, over $150,000,000, held by the Treasury. London cables report continued ease in the money market, by reason of heavy disbursements. They also report gold in active demand by the Orient and also Austria, which causes the premium to be maintained.

New York Silver Prices.

NEW YORK, April 15. — Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	28⅜	61¾
Saturday	28 7-16	61⅞
Monday	28½	62⅛
Tuesday	28½	62⅛
Wednesday	28½	62⅛
Thursday	28 7-16	62

	Copper.	Lead.	Iron.	Tin.
Fri.	11 45 @11 55	3 32½	10 00@12 50	13 35
Sat.	11 50 @11 60	3 30	10 00@12 50	13 30
Mon.	11 40 @11 50	3 30	10 00@12 50	13 25
Tue.	11 37½@11 50	3 35	10 00@12 50	13 25
Wed.	11 35 @11 50	3 35	10 00@12 50	13 25
Thur.	11 35 @11 50	3 35	10 00@12 50	13 30

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	15c Prem
New York Telegraphic Transfer	17½c Prem
London Bankers' 60 days	$4 87¼
London Merchants	$4 85
London Sight Bankers	$4 88½
Refined Silver, per oz., 1000 fine	62¼
Mexican Dollars	49@50

SILVER.—The market advanced the past week in sympathy with better prices in London. The improvement abroad is said to be due to a better inquiry from India. The export movements from New York continue large. *Money*, of London, in its issue of March 31, says that at 28 7-16d "it seems likely that the Indian Government will purchase more freely, and it is not improbable that the Continent will become a buyer once more. Of course, very much depends upon the way in which supplies are forced upon the market; but it can scarcely be worth the while of American holders of the metal to adopt a policy which would clearly be detrimental to their own interests." The appointment of a commission by President McKinley to visit Europe and sound the countries on an international monetary convention may possibly have some effect on the buying.

MEXICAN DOLLARS.—The market is practically unchanged. There has been some quiet buying for shipment to China, but at low current prices.

QUICKSILVER.—There is a fair movement for export and for domestic consumption. The market has held fairly firm at unchanged quotations. The East reports a firmer market at 54@55 cents.

Our market is quoted at $40 for domestic consumption.

COPPER.—The markets at the East and abroad have sold lower, closing weak at the decline. Our market, while not quoted lower, favors buyers. In the face of a large consumption in Europe and this country, it is hard to understand the decline, unless it is through an enlarged protection and more anxiety to sell.

The local market is quoted as follows:

Ingot, jobbing	—@14½
Ingot, wholesale	—@13½
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17

TIN.—In our market there is a good demand for both pig and plate. The market has held to fairly steady prices both in this country and abroad. The tariff has not had much effect as yet.

We quote as follows in a jobbing way:

Pig, per lb	14½c@ —
Plate, I C coke, heavy, per box	$4 05@ 4 15
" " light, "	3 95@ —

POWDER—The market is steady.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

BORAX. — The market is reported unchanged.

The market is quoted as follows:

Refined, in car lots	4¾
Refined, in sacks	5
Powdered, in car lots	5
Concentrated, "	4½

LEAD—There is a continued free consumption. Prices at the East and with us have not varied much the past week.

Our market is quoted in jobbing lots as follows:

Pig	4 00	@	4 25
Bar	—	@	4 50
Sheet	5 62½	@	6 12½
Pipe	4 87½	@	5 37½

SHOT.—The market is steady with only a fair jobbing demand reported.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do. " "	1 60

IRON.—The market is practically unchanged. Some shading is reported on American, but foreign is said to hold to fairly firm prices in view of the proposed tariff. The East continues to report free shipments to Europe.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—Domestic coals have met with a smaller consumption owing to warmer weather. Steam coals are unchanged. The outlook promises a larger consumption of the latter. The market is steady.

COKE.—The market is quoted as follows:

Gas Companies'	—	—	—
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

ANTIMONY.—The market is steady.

Our market is quoted at 7¼@8¼c in a jobbing way. New York mail advices quote 7¼c for Cookson's, 7@7⅛c for Hallett's and 7c for Japanese.

NAILS.—The market is firm.

Wire, carloads, basis per keg		
" jobbing, " "		$2 25
Cut, carloads, " "		
" jobbing, " "		2 10

SPELTER.—The market is steady.

We quote our market in a jobbing way at 5 cents a pound.

NICKEL ANODES.—The markets here and at the East are steady.

PLATINUM.—Dealers report a better inquiry.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC.—The market is steady at quotations.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is firm.

We quote in jobbing lots at 50 cents per pound for ingots.

BISMUTH.—There is nothing new to report.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is steady.

We quote in a jobbing way at 70 to 75 cents per pound.

Chemicals.

The market is steadily firming up in all lines with a better demand reported. It is expected that higher quotations will be made within a few days. Eastern advices state that slightly higher prices are quoted in everything affected by the tariff with still better figures looked for at an early day.

BONEASH.—The market is steady.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is fairly active, but steady at 2½c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is quiet but firm at $1.70 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a good demand at 2½c a pound from stores.

NITRATE OF SODA.—Advices from the East reports a strong market.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is firm at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported steady from store at 6½c per pound in carboys.

SULPHURIC ACID.—The demand is fair. We quote in a jobbing way at 1½c per lb for 66%.

BLUE VITRIOL.—Our market is strong. The East reports higher markets.

We quote in a jobbing way at 4½c per pound.

Mining Share Market.

SAN FRANCISCO, April 15, 1897.

The market has continued fairly active, with Con. Virginia the leader. After selling down to $1.60 and Ophir to $1.05, Chollar to $1.10 and the rest of the list in proportion, it advanced to $1.75, carrying the others up, with Chollar sold up to $1.35. Yesterday morning there was an easier tone and as the day passed the leading shares sold down, closing with Con. Virginia $1.55 bid; but Chollar was $1.20 bid. The action of the market indicates that it is being manipulated for lower prices, for at each decline there is a rally to force the smaller shorts to fill, by which a break can be engineered with no short fillers to interfere. That lower prices can be made for the higher priced shares is generally admitted by usually well-informed operators. These hold to the opinion that without the business of the country showing larger revival, without confidence being restored, and without speculation being more pronounced at the East, it is quite impossible to promote a large deal even if a good-sized showing of ore should be made in one or two of the mines. A few years ago the showing that is now made by Chollar on the Brunswick lode, and that which is being made by Potosi on the Comstock lode, with several other prospects as good as they now are, the market would have sold at a big advance on present prices. The trading would have also been active, with outsiders largely in evidence. To-day there are comparatively few of them, and these are board room chippers and chronic traders. The very low price at which silver is selling is no inducement for mine managers to work silver-bearing ore, even if they should have it in larger quantities than advices indicate. Under this condition it seems to be their policy to exploit the mines for gold-bearing ore, and this takes time, expenditure of money and considerable dead work. There can be no doubt that in quite a number of them dead work has been so well advanced on several levels as to admit of more active exploiting when deemed advisable by the powers that be. From the nature of the work on the Comstock lode it looks very much as if there will be a more general driving to the west, which can be now more easily done since several long west crosscuts have tapped the water, which is said to have interfered with exploiting work in that direction. On the Brunswick lode the work points to a downward continuation with each 100-foot level opened up as it progresses down. With the return of warm weather more active work will be inaugurated in the Bodie district. It is said that preparations have been or are being made for extensive exploiting work, and also for milling on an enlarged form and more economically the ore o' the Con. Standard Company. With those informed on the situation the opinion prevails that there will be more activity in that camp than for several years past.

The following companies report having had balances on hand April 1, 1897: Andes, $7696.42; Alta, $305.27; Best & Belcher, $13,-777.73; Consolidated California & Virginia, $1317.20; Caledonia, $2656.85; Consolidated New York, $356.11; Confidence, $717 69; Consolidated Imperial, $3843.18; Challenge Consolidated, $773.63; Exchequer, $2123.44; Gould & Curry, $842; Julia Consolidated, $784.59; Kentuck Consolidated, $572.66; Ophir, $14,-378.23; Overman, $3906.38; Occidental Consolidated, $1970; Potosi, $540.68; Sierra Nevada, $14,608.27; Standard Consolidated, $18,-228.29; Syndicate, $848.87; Union Consolidated, $1472.37; Utah Consolidated, $2160.77.

The following mining companies report having had an indebtedness April 1, 1897: Alpha Consolidated, $370.68; Belcher, $8569.83; Crown Point, $4719.32; Chollar, due bank $9500, less $355.31 cash on hand; Lady Washington, $1280; Mexican, due bank $1000, less $472.90 cash on hand; Savage, due bank $3000, less $428.45 cash on hand; Segregated Belcher, $54.19; Silver King of Arizona, $1731.84.

From the Comstock lode our advices are largely from official sources, and they are generally as unsatisfactory to assessment-worried shareholders as a picked bone is to a hungry man. The majority of the letters are largely a repetition of those sent for many weeks. The only variations are a change in number of feet run and a few words added or stricken out, so as to give them the appearance of newness. In Utah they are working east from the south drift. They are in over 170 feet. In Sierra Nevada they are also running east, but from the Layton tunnel level. They are in about 370 feet. Work is continued east in Union from the north lateral drift. They are driving ahead, but slowly, three east crossdrifts from the work on the 900-foot level. In both Mexican and Ophir they continue to work on the 1000-foot level—the former running south from a west crossdrift and the latter a west crossdrift. In Ophir they are also exploiting on the

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied.	Deling't and Sale.	Secretary.
Alpha Con M & M Co, Nev	18	5c	Mar 2	Apr 5..Apr 27	C E Elliott, 309 Montgomery
Belcher S M Co, Nev	54	25c	Mar 2	Apr 6..Apr 27	C L Perkins, Mills Bldg
Brunswick Con G M Co, Cal	11	3c	Mar 22	Apr 23..May 15	J Stadfeld
Channel Bend M Co, Cal	7	2c	Mar 22	Apr 24..May 17	J P Langhorne, 39 Sutter
Con Cal & Va M Co, Nev	8	25c	Mar 8	Apr 13..May 3	A W Havens, 309 Montgomery
Confidence S M Co, Nev	28	30c	Mar 12	Apr 16..May 7	A S Groth, 414 California
Crown Point G & S M Co, Nev	70	20c	Mar 24	Apr 28..May 19	James Newlands, Mills Building
East Best & Belcher, Nev	5	15c	Mar 25	Apr 26..May 13	E W Sichel, 337 Pine
Eureka Con D M Co, Cal	8	5c	Apr 2	May 15..June 5	D M Kent, 330 Pine
Golden State M Co, Idaho	1	1½c	Mar 29	May 1..May 17	E Logan, 101 Van Ness
Gray Eagle M Co, Cal	46	5c	Mar 30	May 8..May 29	W J Gurnett, 308 Pine
Hale & Norcross S M Co, Nev	111	10c	Mar 20	Apr 23..May 14	R R Grayson, 331 Pine
Horseshoe Bar Con M Co, Cal	7	10c	Mar 8	Apr 17..May 8	D M Kent, 330 Pine
Jamison M Co	9	5c	Nov 27	Apr 24..June 19	Sam W Cheyney, 120 Sutter
Marguerite G M & M Co, Cal	6	10c	Apr 12	May 24..June 21	F Mettmann, 237 Twelfth
Mexican G & S M Co, Nev	56	20c	Mar 3	Apr 7..Apr 29	C E Elliott, 309 Montgomery
Overman S M Co, Nev	77	10c	Apr 12	May 17..June 7	Geo D Edwards, 414 California
Potosi M Co, Nev	47	20c	Mar 10	Apr 14..May 5	C E Elliott, 309 Montgomery
Savage M Co, Nev	92	20c	Apr 13	May 17..June 7	E B Holmes, 309 Montgomery
Seg Belcher & Mides Con M Co, Nev	19	5c	Apr 6	May 10..May 29	E B Holmes, 309 Montgomery
Sierra Nevada S M Co, Nev	112	25c	Mar 2	Apr 6..Apr 26	E L Parker, 309 Montgomery
Sulphur Bank Q M Co, Cal	5	25c	Mar 23	May 3..June 3	T Wintringham, 306 California
Tenabo M & M Co., Nev	1	50c	Mar 29	May 4..May 24	T J Read, 606 Sutter
Thorpe M Co, Cal	6	2½c	Apr 14	May 22..June 13	A F Frey, Phelan Building
Union Con M Co, Cal	1	10c	Mar 18	Apr 22..May 10	J M Fletcher, 320 Sansome
Union Con S M Co, Nev	54	20c	Apr 7	May 11..June 1	A P Swain, 309 Montgomery

WILL NEGOTIATE with owners or their duly authorized agents only.

WILL INVESTIGATE only thoroughly bona-fide properties, either Mines, Prospects or Mineral Lands, whose owners are willing to make reasonable terms. When sending reports on properties also send terms on which you are willing to sell or lease.

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T. R. MILLER, Vice-Pres't. JOHN D. FLEMING, Counsel.
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Mining Investment Company,
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DENVER, COLO.
Branch Office, - COLORADO SPRINGS.

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Mine well developed. Complete working plant. Situation and facilities first class. Address H. D. RANLETT, Ranlett, Amador County, Cal.

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523 Mission St., San Francisco, Cal.

Central tunnel level. The official letter from Con. Virginia reports continued exploiting work on the 1000-foot, 1550-foot and 1650-foot levels. The letter is more encouraging than for some time past, as it denotes increased activity, particularly on the 1650-foot level. As yet nothing has been found to encourage the belief of a large body of ore being near at hand. The joint Best & Belcher and Gould & Curry east crossdrift was at last advices in soft porphyry. The work in Savage is continued on same levels heretofore reported. No work is being done in Chollar. In Potosi they are working to open up the 1750-foot level. In prosecuting the work they extract some ore. Fully 112 tons have been raised, assaying about $13 gold and 11 ounces silver. The work in Bullion, Alpha, Con. Imperial and Confidence is on the same levels and in the same directions heretofore reported in this department. From Crown Point, Belcher and Seg. Belcher nothing new is at hand. The official letters from the two latter still fail to report levels on which they are at work and also about the ore said to have been struck some time ago. In Overman and Caledonia the work is practically unchanged. The management of the former has succeeded in striking an assessment—but this should not create surprise. Private advices, it is reported, from Alta are quite encouraging, but nothing, it is said, is allowed to leak out.

From the Brunswick lode our advices continue to report active work in Occidental, Chollar, Savage and jointly by Best & Belcher, Gould & Curry and Con. Virginia. In these mines the work is practically unchanged, but it indicates an earnest desire to open up these mines to the best possible advantage for future operations. Chollar has resumed extracting and shipment of ore. Last week's letter reports 94 tons extracted and shipped to the mill. The top assays averaged $10.25 in gold and 14.58 ounces of silver.

The following illustrates the changes of the week:

MINES.	Apr. 8.	Apr. 15.
Alpha	$ 10	$ 08
Alta Consolidated	08	.....
Andes	22	20
Belcher	37	35
Best & Belcher	66	64
Bodie	.....	.....
Bullion	10	.....
Challenge	36	33
Chollar	1 15	1 15
Confidence	81	.....
Consolidated California and Virginia	1 60	.....
Consolidated New York	.....	.....
Crown Point	16	.....
Exchequer	.....	.....
Gould & Curry	35	33
Hale & Norcross	88	88
Justice	.....	.....
Mexican	46	46
Ophir	1 00	1 00
Overman	.....	.....
Potosi	33	63
Savage	.....	20
Sierra Nevada	47	47
Union	26	.....
Utah	.....	.....
Yellow Jacket	28	.....

San Francisco Stock Board Sales.

SAN FRANCISCO, April 15, 1897.

9:30 A. M. SESSION.

200 Andes	20	100 H. & N.	88
100 Belcher	36	100 Mexican	46
100 Best & Belcher	63	100 Ophir	1 00
100 Challenge	33	100 Potosi	63
100 Gould & Curry	33	200 Savage	21

SECOND SESSION—2:30 P. M.

200 Mexican	44	200 Belcher	36
100 Best & Belcher	64	300 Sierra Nevada	47
500 Savage	20	250 Caledonia	12
600 Chollar	15	900 Andes	20
1200 H. & N	86	5300 Nev Queen	05
100 Alpha	08		

Rainfall and Temperature.

The following data for the week ending 5 A. M., April 14, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week	Total Rainfall to Date	Total Seasonal Rainfall Last Year to Same Date	Average Seasonal Rainfall to Date	Maximum Temperature for the Week	Minimum Temperature for the Week
Eureka	....	48.04	42.13	39.43	36	72
Red Bluff	....	23.74	17.19	23.31	52	86
Sacramento	....	16.87	19.09	18.53	50	83
San Francisco	....	22.57	17.23	21.85	50	81
Fresno	....	10.53	5.99	6.49	48	90
San Luis Obispo	....	20.71	15.88	....	42	94
Los Angeles	....	16.74	8.88	18.79	48	90
San Diego	....	11.63	5.80	9.85	50	88
Yuma	....	5.35	.88	2 92	56	96

THE CALIFORNIA DEBRIS COMMISSION having received applications to mine by the hydraulic process from T. C. Cox and W. C. Pidge, in the Philadelphia mines, near Columbia, Tuolumne Co., to deposit tailings in Rose and Eagle creeks, and from F. G. Curnow and others, in the Little Grass Valley Mine, near Columbia Hill, Nevada Co., to deposit tailings in an old reservoir, gives notice that a meeting will be held at room 59, Flood Building, San Francisco, Cal., on April 19, 1897, at 1:30 P. M.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from M. J. Williams and others, in the Galena Hill Mine, near Camptonville, Yuba Co., to deposit tailings in Eastman's Ravine; from Joseph Hustler, in the Hustler Mine No. 2, near Cherokee, Nevada Co., to deposit tailings in Shady Creek; and from McGregor & Nix, in their mine near Cueroke, Butte Co., to deposit tailings behind the impounding works of the Spring Valley Mine, gives notice that a meeting will be held at room 59, Flood Building, San Francisco, Cal., on May 3, 1897, at 1:30 P. M.

Assessment Notices.

THORPE MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 14th day of April, 1897, an assessment (No. 6) of .02½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company room 44 Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 22d day of May, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 14th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

HALE & NORCROSS SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 20th day of March, 1897, an assessment (No. 111) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 11, 331 Pine street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of April, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on FRIDAY, the 14th day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

R. R. GRAYSON, Secretary.

Office—Room 11, 331 Pine street, San Francisco, California.

SEG. BELCHER AND MIDES CONSOLIDATED Mining Company.—Location of principal place of business, San Francisco, California; location of works, Gold Hill Mining District, County of Storey, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 6th day of April, 1897, an assessment (No. 19) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, No. 309 Montgomery street, Room 50, Nevada block, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1897, will be delinquent, and advertised for sale at public auction, and, unless payment is made before, will be sold on SATURDAY, the 29th day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. B. HOLMES, Secretary.

Office—No. 309 Montgomery street, Room 50, Nevada block, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 12th day of April, 1897, an assessment (No. 6) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of May, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 21st day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California. Office hours from 5 to 6 o'clock P. M. The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9), of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on WEDNESDAY, the 21st day of February, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 26th day of March, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on SATURDAY, the 24th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 19th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

DEWEY & CO.
SCIENTIFIC PRESS PATENTS PATENT AGENCY
220 MARKET ST. S.F.

NOTICE TO CONTRACTORS—Electric Lighting Plant. Office of the Water Commission, Astoria (Or.), April 8, 1897.—Notice is hereby given that sealed proposals will be received at this office until 12 o'clock, noon, May 1, 1897, for the various works and materials necessary for the installing of a series sixty-arc-light plant to be operated by an impulse water wheel, and owned by the municipality. Proposals must be made on printed forms supplied by the clerk of the Commission, and in full accordance therewith, and must be accompanied with a certified check of bank deposit in an amount equal to (10) per cent of the aggregate sum bid, made payable to the clerk of the Astoria Water Commission. Duplicates of bids and accompanying specified plans shall be filed at the office of the engineer on or before the date mentioned. Plans and specifications can be seen after April 15th, either at the office of this Commission or at the office of the engineer.

THE ASTORIA WATER COMMISSION.
By W. W. PARKER, Chairman.
Attest: H. G. VAN DUSEN, Clerk.
ARTHUR L. ADAMS, M. Am. Soc. C. E. (Engineer, 401 California Street, San Francisco, Cal.

OFFICE OF THE HALE & NORCROSS SILVER Mining Company, Room No. 11, San Francisco Stock and Exchange Building, No. 331 Pine street, San Francisco.

To the Stockholders of the Hale & Norcross Silver Mining Company and to all others concerned:

Notice is hereby given that, pursuant to the consent, in writing, of the holders of two-thirds of the capital stock of the Hale & Norcross Silver Mining Company, duly filed in the office of said company, the principal place of business of said Hale & Norcross Silver Mining Company has been changed from Room No. 11 of the San Francisco Stock and Exchange building, No. 331 Pine street, in the City and County of San Francisco, State of California, to Room No. 1 in the same building, where the business of said Company will be hereafter transacted. This notice is published in accordance with Section 321 of the Civil Code.

Dated March 19, 1897.

By order of the Board of Directors.

R. R. GRAYSON, Secretary.

Stockholders' Meeting Jamison Mining Co.

Notice of Annual Meeting of Stockholders of the Jamison Mining Company: In accordance with the by-laws of the company, the regular annual meeting of stockholders of the company will be held at 2 o'clock P. M. on MONDAY, the 3d of May, 1897, at the office of the company, rooms 50 and 54, 120 Sutter street, San Francisco, California.

By order of the President.

SAM W. CHEYNEY, Secretary.

Dated San Francisco, April 9, 1897.

STOCKHOLDERS' MEETING.—Notice of Stockholders' Meeting of the Steeple Rock Development Company: In accordance with a resolution passed by the Board of Directors of the Steeple Rock Development Company, a meeting of the stockholders of this company will be held at 3 o'clock in the afternoon on TUESDAY, the 11th day of May, 1897, at its principal office, No. 320 Sansome street, room 24, San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Million Dollars, in four hundred thousand shares, at the par value of five dollars each.

H. PICHOIR, Secretary.

Dated at San Francisco, Cal., March 26, 1897.

STOCKHOLDERS' MEETING.—Notice of Stockholders' Meeting of the Alaska Juneau Gold Mining Company.—In accordance with a resolution passed by the Board of Directors of the Alaska Juneau Gold Mining Company, a meeting of the stockholders of the company will be held at 2 o'clock in the afternoon on WEDNESDAY, the 21st day of April, 1897, at its principal office, room 23, 320 Sansome street, San Francisco, to consider and vote upon a proposition to increase the capital stock of this company to Five Million Dollars, in five hundred thousand shares at the par value of ten dollars each.

R. M. MEIN, Secretary.

Dated San Francisco, Cal., March 13, 1897.

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OFFICE OF THE CANDELARIA CONSOLIDATED MEXICAN MINING CO.,
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D. M. BURNS, Superintendent.

BULLION-BECK AND CHAMPION MINING COMPANY.
EUREKA, UTAH, August 24, 1895.

THE RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: Referring to contract made by you with the Bullion-Beck and Champion Mining Company, by which you were to furnish one 5-foot Bryan Roller Quartz Mill on four months' trial, in competition with the Huntington Mill, would say that we have made the test, and the Bryan Mill has proven so greatly superior on all points claimed, viz., capacity and economy, that we have ordered a second Bryan Mill from you and have concluded to discontinue the use of the Huntington Mill.

Yours truly, JOHN BECK, Pres.
SIMON BAMBERGER, Director. [Copy.] W. J. BEATIE, Sec'y.

BULLION-BECK AND CHAMPION MINING COMPANY.
EUREKA, UTAH, Aug. 24, 1895.

THE RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: In February last, in connection with the five-foot Bryan Roller Mill which we took from you to test in competition with the Huntington Mill, we also took a six-foot Johnston Concentrator to be tested with ten Frues, one end shake with four belts and one side shake Woodbury. We have been working these machines since the mill was completed, at such times when we had sufficient water.

The terms on which the test was made was that the machine doing the most satisfactory work should be accepted and the others taken out. This did not apply to the Frue, as they were purchased with the plant. In compliance with this agreement, we now inform you that the Johnston Concentrator has proved so superior over the other machines that we now order from you four more of the Johnston Concentrators. Yours truly, JOHN BECK, Pres.

SIMON BAMBERGER, Director. W. J. BEATIE, Sec'y.

GREAT SALT LAKE AND HOT SPRINGS RAILWAY.
S. BAMBERGER, President and Manager.
SALT LAKE CITY, UTAH, October 10, 1895.

B. R. TAWNDRAW, ESQ., care Guyer Hot Springs, Ketchum, Idaho—Dear Sir: In reply to yours of the twenty-eighth of September, we have been using at the Bullion-Beck Concentrating Works, Frue Vanner, Woodbury and Johnston machines, side by side for the last four months; and after a thorough trial of all of them, we concluded that the Johnston Vanner was doing the most accurate work and was the best; hence, we bought four more Johnston machines and shall continue to use them in preference to any other.

You will find it the easiest regulated machine and very much easier set up than either of the other machines. We bought our machines from the Risdon Iron Works, of San Francisco, where Mr. Johnston, the patentee, personally superintends the manufacturing of them.

Hoping you will make a success, I remain, Yours truly,
[Copy.] [Signed] SIMON BAMBERGER.

THE GOLD VALLEY MINING COMPANY OF SAN FRANCISCO.
C. C. McIVER, President; D. CUSHMAN, Secretary.
MISSION SAN JOSE, CAL., Oct. 17th, 1895.

RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: We take great pleasure in having to inform you that, after a careful investigation extending over a six weeks' steady run alongside of six other concentrators, the Johnston which you put in for us was the only machine from which you could not find a loss in the tailings. It has done all you claim for it and has proved more than satisfactory. We intend replacing all our other concentrators with Johnston's, as we are convinced they will pay for themselves many times over in a year. CHAS. C. McIVER, President.

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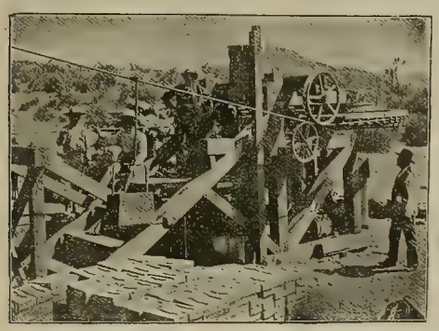
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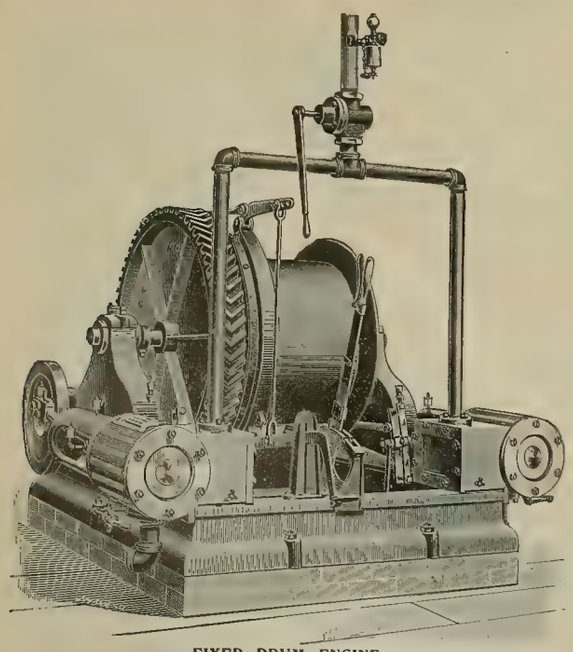
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AND PACIFIC ELECTRICAL REVIEW.

No. 1920.—VOLUME LXXIV. Number 17. SAN FRANCISCO, SATURDAY, APRIL 24, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Arrastras.

That the arrastra for small work is still a great favorite, especially in the remoter districts in the mountains away from the wagon roads, there can be no question. In western Siskiyou, Trinity, Plumas and all along the Sierras south these serviceable gold savers may be seen. In many places it is almost impossible to bring in heavy freight, owing to want of wagon roads, and nearly all the material for building an arrastra may be found on the ground.

E. B. Preston, in his "California Gold Mill Practices," says: "Although the arrastra has been largely superseded by the stamp mill, the fact remains that it is the cheapest and best all-round gold-saving appliance we have. Hence its use is always indicated where small, rich veins are worked in the higher mountain regions."

On this page is illustrated an arrastra in use at the Georgia mine in Redding canyon, Inyo county, owned by George F. Willis of Independence. It is a 10-foot arrastra, driven by 12 miners' inches of water on an 18-inch sigmoidal wheel under 90 feet pressure through 450 feet of 4-inch pipe. The drags (mullers) weigh from 300 to 800 pounds and make about eight revolutions per minute.



ARRASTRA OF THE GEORGIA MINE.

On page 345 will be found plans for building a double arrastra which costs but little, and with the exception of a very little iron and nails all the material for its construction may be found in most of the mining districts of the State. The plans are from an arrastra at the Commodore mine in Siskiyou county, owned by C. C. Humphrey of Scott Bar. It reduces five tons of ore per twenty-four hours, and cost, complete and ready to run, about $700. It requires two men, one on each shift, and is driven by a wooden hurdy wheel, 18 ft. in diameter, using 30 miners' inches of water, supplied through a 7-in. pipe with a 2-in. nozzle, under 100 ft. pressure. The two grinding pits are situated one on each side of the water wheel, so that its shaft, *L*, transmits the power by pin wheels (at right angles to each other) to the arrastra shafts, *H H*. The horizontal pin wheels, *I I*, have fifty-one perpendicular hard-wood pins, 2 in. in diameter, 4 in. in length, and set 4 in. apart from center to center. The pin wheels, *K K*, are 3 ft. in diameter, and are built on the 2-ft. wheel shaft. Each has thirteen hard-wood pins, 2 in. in diameter, 4 in. in length, driven in horizontally, 4 in. apart from center to center. Both wheels are made of sections of 2-in. plank, nailed together and bound with two bands of wagon tire. The ends of each shaft terminate in 3-in. iron spindles. Each pit is built as follows: Heart-wood center post, *A*, 8 ft. long and 18 in. in diameter, is set 4½ ft. in the ground; around this a double floor, *B*, 16 ft. square and made of 2-in. plank, is laid as a foundation. Next, the circular rim, *C*, 12 ft. diameter, is built of 2-in. plank with broken joints, until the top is 38 in. above the floor. In the pit thus formed, moist clay, *D*, is rammed, a thin layer at a time, until it is 10 in. thick. Next, a bed of dry, clean sand for the pavement is placed upon the clay. The pavement is made of hard, fine-grained rocks (trap), having at least one nearly flat surface, which are placed as close together as possible and the interstices filled with spawls tightly wedged. The annular pavement, *E*, should be as smooth as possible, and with a depression 4 in. deep. The drags or mullers, *F F*, are made of the same rock as the pavement, and weigh from 800 to 1000 lbs. each. By means of eyebolts, let into the rock, they are hung to the drag-arms, *G G*, by chains. The forward edge of the drag is raised about 1 in. to allow it to pass over the material, and the eyebolts are so placed that one corner of the drag is somewhat in advance. As it plows through the pulp, a portion is pushed to one side, directly in the path of the next following drag. The relative position and size of the drags must be such that every part of the pavement is passed over in each revolution. The proper speed is twelve revolutions per minute. The *modus operandi* is as follows: Each charge, consisting of one and one-fourth tons of ore, broken to the size of a walnut, is gradually shoveled into the pit, water enough being added to make a rather thick pulp when the quartz is pulverized. After eight hours grinding (more or less, according to the hardness of the ore), two ounces of quicksilver for every $20 gold in the ore is added gradually. After two hours more, the speed is reduced to four revolutions per minute, to allow the amalgam to settle, water being added to thin the pulp. After another two hours, or when a pan scraped along the bottom does not show any amalgam or quicksilver, the pulp is allowed to pass off slowly into the sluices. The outlet for this purpose is made as follows: A slot 16 in. high and 6 in. wide is cut through the rim, extending from a point 4 in. below the top of the rim to the pavement. This opening is closed by pieces of board 2 in. high and sliding in guides. By removing these pieces, one by one, 2 in. in depth of pulp can be run off each time. The sluices into which the pulp flows are from 12 ft. to 24 ft. long, and the bottom is covered with amalgamated plates, riffles, and burlap. When the arrastra is emptied to within 3 in. or 4 in. of the bottom, the outlet is closed, the speed is increased, and a new charge of ore put in. About once a month the paving is taken up and the amalgam collected from the sand below, cleaned and retorted.

A WISE step is being taken by the Executive Committee of the California Miners' Association in striving to increase the interest in the organization throughout the mining sections of the State by strengthening the local or county associations. For some time past the vice-president of the California Association, Samuel K. Thornton, has been visiting the principal mining centers and has been calling to the attention of the miners the advantage of giving the Association support by joining the local organizations, and has been doing good work in starting the formation of local branches where they have not heretofore existed. He believes that 10,000 men can be induced to join, and if so—or even if half that number join—the California Miners' Association will be put upon a firm basis and enabled to go on with the work it has in hand. Under great difficulties and with very little money the Association has done splendid work in the past, and there will be even more need for its services in the future.

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TO THE PUBLIC.

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San Francisco, April 24, 1897.

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A New Field to be Opened.

There is a plan of business men in the East to have representatives visit the ports on the Mexican, Central American and South American coasts with a view to ascertaining what may be accomplished in the way of establishing business relations between the countries of the south and the United States. It would be well for mining machinery manufacturers to be represented in this undertaking. The time will come very shortly when Mexico and South America will receive a great deal of attention in the mining world. Those first upon the scene will reap the greatest rewards.

Hardly a week passes now that there do not come requests from the south for men specially fitted for certain kinds of mining or for machinery for large enterprises. From this State during the past six months a large number of skilled engineers and practical miners have been engaged for different countries of South America, including Brazil, Peru, Bolivia, United States of Colombia and the Guianas. The friendly feeling on the part of the peoples of these countries for those of the United States should be a great advantage. American skilled miners have done more than those from all other countries for the opening up of African, British Columbia and Mexican mines, and there should be no reason why the first and best fruits from South America should not come this way.

The discovery and opening up of mines has done more for Africa than anything else. So, too, with Australia and British Columbia; and if the world's attention is to be attracted to Mexico and to South America in the near future, it will be through the opening up of the mineral resources.

The Railroad's Last Move.

The following is a sample of a number of items that have been going the rounds of the press in the country for some months past:

The Southern Pacific Company has, through its land agent, W. H. Mills, issued a circular stating that miners who wish to prospect on railroad lands can do so under contract, and the company will willingly relinquish all claim to any operated mine on their lands. Lands which can be reasonably classified as mineral lands will be held for encouragement of mining, the policy of the company being to encourage mining and the development of such enterprises.

This item and others similar in tone have been printed most persistently during the past few weeks, more especially in newspapers with railroad leanings, but quite often in those which have not.

This work on the part of the railroad people at this particular time is in the nature of "back firing" in their fight against the mineral lands bill now before Congress. Doubtless clippings from the papers will be made and presented to the committees of Congress to show that there is no real need for the passage of the proposed bill, because the railroad will do more for the miners than would the Government. In southern Oregon the same tactics are being pursued. It is presumption for the railroad to make these offers in regard to lands that they have no honest title to. It is not theirs to give to miners or any others the privilege to develop or work mineral lands. Their offer, as far as it relates to the lands to which they have already obtained patents, is made in order to disarm opposition to their plans to acquire title to others.

Assessment Work on Locations.

The new mining act of California was signed by the Governor on March 27th and will go into effect May 26th. Lode locators should take notice that $50 worth of work must be done within sixty days after posting the preliminary notice. This applies, of course, only to those claims located after the act goes into effect. The impression seems to prevail that this amount of work will be counted in and be given credit for as part of the annual assessment work required by the Federal statutes, but in very few cases will this be so. Section 2324 of the United States statutes was amended January 22, 1880, by adding the following words:

"*Provided*, That the period within which the work required to be done annually on all unpatented mineral claims shall commence on the first day of January succeeding the date of location of such claim; and this section shall apply to all claims located since the tenth day of May, A. D. 1872."

In the case of lode claims the amount of labor that would have to be performed up to within a year from the first of January succeeding the date of location would be therefore in California $150 worth.

The new State law requires that $10 worth of work must be done on each twenty acres of placer ground located within sixty days after location. Besides this, under the United States statutes, the required annual assessment work must be done.

In cases where claims are located near the end of the calendar year it will be possible to do the required $50 worth of work after January 1 of the year following and within sixty days of location, and so make it part of the required annual assessment work specified by the United States statutes.

School Sections and Mineral Lands.

There has been some question raised as to one section of the act of the California Legislature to repeal the Act of March 28, 1874, to provide for the sale of mineral lands in Sections 16 and 36—school sections ceded to the State by the Federal Government. Section 3 of the Act is as follows:

The sixteenth and thirty-sixth sections belonging to the State, in which there may be found valuable mineral deposits, are hereby declared to be free and open to exploration, occupation, and purchase of the United States, under the laws, rules and regulations passed and prescribed by the United States for the sale of mineral lands.

This section gave the advocates of the bill much trouble. It was contended on one hand that with a repeal of the old laws permitting purchases of these lands from the State, the mining possessions would be upheld, although no title could be obtained, and that Section 3 was a nullity, but that as a whole the bill would prevent much trouble. Then again it is contended that the land is by the Act receded to the United States Government. But it is asked: The State having got title by virtue of the return of the Surveyor General, how can such title be divested so as to permit mineral claimants to purchase from the United States? Nevada has ceded back to the Federal Government the mineral lands in school sections acquired by that State.

In regard to this, the author of the bill, Mr. A. H. Ricketts, says:

I intended that said section should operate as a complete retrocession of the title of the State to such portions of the school sections as might at any time be found to be valuable for minerals, and for which application to purchase might be made to the United States. It is said, in that section, that lands containing valuable mineral discoveries are "free and open to * * * purchase of the United States, under the laws, rules and regulations passed and prescribed by the United States for the sale of mineral lands." This I take to be a waiver of the claim of the State to the land in place. It cannot be assumed that the Legislature would do so vain a thing as to declare that lands can be purchased of the United States unless all necessary incidents to the carrying out of the provision are presumed. It might have been added that, when lands were purchased of the United States under the provisions of the act, such purchase should be considered as a waiver of the claim of the State; or a provision in express terms that all mineral deposits occupied and purchased of the United States are ceded by the State to the United States; but I think that these things are all presumed and are necessary conclusions from the wording of that section. When an application of this character is made in the United States Land office, it will, in my opinion, be necessary only to suggest this bill to effect a complete waiver of the claim of the State; and the United States will deal with the property the same as other public lands. The permission and resulting waiver are limited by the terms of the act to those valuable mineral deposits which, except for the claim of the State, would be subject to sale under the United States mineral laws.

My theory in drafting this section was that it should be as concise and comprehensive as possible. I feel confident that the Interior Department of the United States and the courts will decide as I have suggested. The intent of the Legislature is shown in the balance of the bill, which provides for the reservation of mineral lands, and repeals all State laws for the sale thereof. It leaves the mineral lands of the State subject to only one method of disposal, and that is by purchase of the United States, as provided in the third section.

Forestry Commission Report.

The substance of the detailed and voluminous report to be submitted by the Government Forestry Commission, the body designated by the National Academy of Science, is embraced in the following letter, which has been submitted by the commission to the Secretary of the Interior, in advance of the formal report to be made early next month:

The legislation relating to reserved forest lands of the public domain, which the commission of the National Academy will recommend in its final report, now in course of preparation, provides for the following:

First—That authority be given to the Secretary of War to make details of troops, at the request of the Secretary of the Interior, to protect temporarily and until the forest service is organized the property of the Government in the forest reservations from fire and trespass and to enforce such rules and regulations as he may make for their care.

Second—The establishment of a permanent forest bureau in the Department of the Interior, composed of trained officers, to administer, maintain and improve the reserved forest lands.

Third—The appointment of a commission to institute as rapidly as possible, under the supervision of the director of the Geological Survey, topographical surveys of the reservations, and determine what portions of them should be reopened to entry and sale.

Fourth—To authorize the Secretary of the Interior to issue the necessary rules and regulations for the protection, growth and improvement of the forests on the reservations, for the sale of timber, firewood and fencing from them to actual settlers in and adjacent to the reservations and to owners of mines legally located therein, for use in such mines; granting permits to sawmill owners to enter the reservations for the purpose of manufacturing such lumber as may be sold actual settlers in and adjacent to the reservations and to the owners of mines located therein; for allowing actual settlers who have no timber claims to take from the reservations firewood, posts, poles and fencing material necessary for their immediate personal use; for allowing the public to enter and cross the reservations; for granting county commissioners right of way for irrigating ditches, flumes and pipes and for reservoir sites, and for permitting prospectors, under such rules and regulations as he may from time to time establish, to enter such reservations in search of valuable mineral.

The commission will recommend that the reservations be opened to the location of mining claims under the general mining laws, and that the owners of valid mining locations in the reservations made and held in good faith shall be permitted to fell and remove from their claims the timbers growing on them for actual mining purposes in connection with the particular claim from which the timber is cut. It will also recommend that the owners of unperfected bona fide claims or patents of land included in the forest reservations be permitted to relinquish their claims, the Government selecting in lieu tracts of vacant land open to settlement, but not exceeding in area the tracts covered by their claims or patents; and that the owners of such unperfected claims shall not be subjected to additional charges for entries or record, and that credit shall be allowed them for the time spent on the relinquished claims.

The commission will also recommend that the Secretary of the Interior be authorized to enter into negotiations with the land grant railroad companies for the purpose of concluding agreements by which these companies may relinquish to the United States the title acquired by them to lands within their grants and indemnity limits when these lands lie within the boundaries of forest reservations, and may accept other unappropriated lands in exchange for the even numbered sections within their granted and indemnity limits not included in forest reservations.

Concentrates.

OVER 500 miners are now regularly employed at Mercur, Utah.

A SECOND mining exchange is being organized at Spokane, Wash.

THE number of miners engaged in Russian mines exceeds 500,000.

IN the past three years Owyhee county, Idaho, has produced $7,000,000 in bullion.

THERE are 340 men on the pay-roll of the Mountain Copper Company at Keswick, Shasta county, Cal.

SURVEYS are being made of a site secured near Nelson, British Columbia, for the erection of a smelter.

THE gold exports from West Australia for March amounted to 40,296 ounces, against 32,526 for February.

THE mines of Yuba and Butte counties are being examined for the State Mineralogist by E. B. Preston.

BAYNE & AHART will erect soon a 5-stamp mill on the Belle Union quartz mine at Weimar, Placer county, Cal.

ANOTHER strike has been reported from the Harqua Hala mountains in Arizona, not far from the Sunset mines.

WORKMEN sinking a well in the town of Nelson, B. C., last week, found gravel bearing gold in paying quantities.

SENATOR E. W. CHAPMAN has bonded the Black Oak mine, near Weimar, Placer county, Cal., from Wyman, Seaver & Co.

MINING MACHINERY manufacturers in the West are not complaining that the "wave of prosperity" has not struck them.

THE assayer of the United States assay office at Helena, Montana, states that gold is coming in more freely than last year.

THERE are over forty companies registered in London formed to carry out operations in, or in connection with, British Columbia.

ON Dry creek, near Golden, Colorado, an oil well being driven is down 610 feet and in solidified shale saturated with oil.

THERE was exported from New York in the week ending April 8th to Europe 1,840,000 ounces of silver, valued at $1,140,800.

THE Old Dominion copper mine and smelter at Globe, Arizona, closed down last Monday, throwing 300 men out of employment.

THE gold yield of the colony of Queensland, Australia, for March was 64,800 ounces, of which 13,700 ounces came from the Mount Morgan.

THE owners of the Highland Boy mine at Mammoth, Utah, have let a contract for the erection of a mill with a capacity of 200 tons of ore daily.

ST. LOUIS people, represented by Stephen Peck, who have a bond on copper properties near Casa Grande, Oregon, propose to erect a smelter.

THERE was discovered near Kamloops, B. C., last week what was supposed to be a diamond, which has been sent to Victoria for examination.

ACCORDING to the Spokane *Spokesman-Review* the owners of the Reco mine of the Slocan, B. C., have sixteen cars of ore in transit which will average $3500 a car.

THE good work of the prospectors during the past winter in the south is shown by the great interest being taken in newly discovered mines in New Mexico and Arizona.

AT the Millikin Ranch mine, near Nevada City, Cal., new hoisting works are to be built by the owners, Poorman & Hastings, to take the place of those burned last week.

THE export of gold from British Guiana for the first two and a half months of this year amounted to $272,571 in value, an increase of $29,533 over the corresponding period of 1896.

THERE is to be a great deal of railroad building in the Kootenay, British Columbia this summer, and it is reported that inquiries are being made for 5,000 men to begin work in June.

AT Crum canyon, in Lander county, Nevada, in the coal mine opened a short time ago, they have a seam 40 inches thick, which is widening, and the coal tested is of good quality.

IT is claimed that there will be twice as many men engaged in developing mines this season, as soon as the weather has settled, as there ever has been in the Black Hills, South Dakota.

IT is announced as the intention of the Le Roi Company, at Rossland, B. C. or individual owners to build a smelter this summer either at Northport, Washington, or between there and Rossland.

ABOUT forty miles north of Helena, Montana, near the Missouri river, the Boston & Montana and other companies are taking considerable interest in promising new discoveries of copper deposits:

A NICKEL DEPOSIT has been discovered near Washington, Nevada county, Cal., and a quantity of ground has been located. The assays made show a large percentage of nickel and some gold.

JOHN TAYLOR & SONS of London, one of the heaviest firms there as mining engineers and dealers in mines, are sending a representative to British Columbia to inspect mining property in their behalf.

JAMES HILL, of the Great Northern, proposes soon to begin the construction of a branch line from Jennings or Kalispel, Montana, to Wardner and to Fort Steele, in British Columbia, to tap the rich mineral belts.

In the new town of Preston, in the Ragged Top district in the Black Hills, the streets will soon be paved with $20 ore. Ore, unless worth more than that, cannot be shipped with profit, and such material is to be put in the streets.

THE Alaska-Treadwell reports for March, twenty-eight days run: Bullion shipment, $45,052; ore milled, 18,642 tons; sulphurets treated, 401 tons. Of bullion there came from sulphurets $15,775; gross expenses for period, $24,054.

THE concession granted by the Dominion Government to F. August Heinze and his associates to build the Columbia and Western railroad in British Columbia amounts to about 3,450,000 acres of land and about $400,000 in cash subsidy.

THE representative of an Eastern company has lately been in Nevada City and Grass Valley trying to make arrangements with the mining companies for working their tailings; and, if terms are satisfactory, promises to put up a plant.

MRS. LAVINA E. HAYNES, a Chicago milliner, made some money in stock in a Cripple Creek property two years ago, sold her store and went to Colorado. Now she is returning to Chicago to close a sale of a $75,000 property she has placed.

F. M. STEVENS has applied to the Canadian Government for the privilege of establishing a series of trading posts in British Alaska, extending from the Klondiek country to the boundary, the stations to be at distances of fifty miles apart.

FOR the eight months ending with February last the imports of gold into the United States was valued at $79,729,952 and exports $14,756,455. For the same period ending with February, 1896, the imports were only $29,786,501, against exports of $82,180,764.

THERE are numerous old gold mines in Germany which were shut down—some because of exhaustion of ore and some by the Thirty Years War. Of the latter the Newalbenreuth in the Upper Palatinate was worked up to the Thirty Years War and the books are still in existence.

THE Oonegum, an Indian mine, produced in 1896, 63,888 tons of ore from which 59,461 ounces of gold was extracted by milling, and from 59,461 tons of tailings 10,413 ounces were obtained. The total gold produced was 63,845 ounces, valued at £246,645, on which the profits were £108,956.

SAMPLES of graphite from the newly discovered mines at Renfrew, in Ontario, Canada, were sent to the Johann Faber factory in Bavaria, and the manufacturers state that, upon testing it, they have found it equal to their own Bohemian graphite. They have given an order for a trial shipment of forty tons.

MANAGER FRANK NICHOLSON of the Consolidated Gold Fields of Mexico reports the latest assays as follows: 1. East breast of San Juan 4½ feet wide, gold $10, silver $15.06, total $25.06. 2. West breast of San Juan 4¼ feet wide, gold $10, silver $16.06, total $26.06. 3. Ore being hoisted from old chute, gold $4, silver $5.61, total $9.61.

IT has been estimated that, owing to the increased demand for copper in this country, the exports in 1897 will not exceed 80,000 tons, against 125,000 tons in 1896. The total visible European supply, including that afloat, was on April 1st 32,222 tons, which, with the exception of the amount at the first of last month, is less than for many years.

THE shipments of ore from the mines of Rossland, British Columbia, from Jan. 1 until April 10 amounted to 15,896 tons, of which amount the Le Roi has shipped 11,112 tons; the War Eagle 2991 tons; Iron Mask, 863; Columbia and Kootenay, 455; Josie, 126; the balance, 349 tons, is from seven other mines, of which 86 tons were concentrates from the O. K.

A REPRESENTATIVE meeting of members of the Chamber of Commerce, the Miners' Bureau, Mining Exchange and Real Estate Exchange of Denver, Colorado, was held last week to arrange for the proposed National Gold Mining Convention. It was decided to have appointed an executive committee of twenty members from the bodies represented to promote the enterprise.

A COMPANY has been formed in Colorado with a capital stock of $1,750,000 to build a railroad to connect the Cripple Creek towns. The proposed system is to start near Victor, run through Horseshoe pass to Cripple Creek. Connections will run to Gillett, Goldfield and Independence, and connection will be had for carrying ore to the main lines from all points of the district.

THE mining committee of the Legislature of British Columbia has recommended that aliens be not allowed to take up mining claims. While this will work some inconvenience it is claimed that there will be no hardship connected with the passage of such an act. The committee also recomends that a person filing an adverse claim must prove that the location is no good.

THE Federal Government will in a few days dispatch a company of infantry to the Yukon gold mines. An officer, probably with the rank of colonel, will be in command and will be given extraordinary powers. Besides that, a United States Commissioner will be appointed and stationed at Circle City. The Secretary of the Interior will appoint a surveyor to survey the mining claims, and the Secretary of the Treasury will detail an officer of the Internal Revenue Service.

LEADING MINERS of Tintic, Utah, held a meeting last week, at which it was decided to contest the new mining law which provides that district recorders shall turn over their records to the county recorders, and that in future all records must be filed with the county official. Resolutions were passed asking the district recorder to refuse to give up his records as required by the new law, on the ground that they are the property of the miners of the district, and not of the State or county.

THERE seems to be a peculiar situation at Fool's Gulch, five miles southeast of Congress, Arizona, wherein the Planet Saturn Company developed their mine to considerable extent and built a mill, and after operating it two or three months closed it down. The management comprises Boston parties, and, while rumors are abundant, there seems to be no reliable information as to the cause of the closing down of the property, which has long been considered a valuable one.

EXPERIMENTS are being made at Niagara, which may have an important effect upon copper mining. According to the Chicago *Inter Ocean* it has been found possible to substitute aluminum for copper for the transmission of heavy currents used in the reduction process. A line made of aluminum weighed eleven and one-half tons, whereas it would have required twenty-four tons of copper. The relative conductivity of copper and aluminum is as 100 to 63; but copper being three and three-tenths heavier than aluminum, weight for weight, aluminum has a conductivity, relative to copper as 208 to 200.

AT the annual meeting of the Sierra Buttes Gold Mining Company, held in London early in the month, the chairman, in his address, said: "However small the profit was, we were satisfied to go on working the mines in the hope that some developments might be made to give us better returns in the future. Pursuing that policy during the past half-year, a small profit was made and considerable development work done. The total profit at the various mines only amounted to £3880 16s 10d, of which £1647 7s 2d was the share of the Buttes and £2233 19s 8d that of the Eureka. The Whitlock paid for its own development out of its profits before this amount was brought to account; but the Mammoth earned hardly anything—the ore was so poor—and the amount of expenditure over its earnings for development during the last half-year was £1849 10s 2d.

IN the case of co-owners advertised as delinquent. or served personally with notice of delinquency, they have from the time of the personal service 90 days in which to pay up, and, in case of publication of notice, 90 days from the last day of publication. As the notice must be published 90 days, this gives 180 days from the time of the commencement of the publication of the notice.

THE Amador *Record*, published at Sutter Creek, Cal., has issued a special mining edition that is of value. The forty pages are filled with conservative accounts of the mines and mills and statistics of one of the richest counties in the State. Amador has been particularly fortunate in securing the attention of capital during the past few years and as a result the claim of the *Record* that it will soon lead all counties of the State in the production of gold is apt to be borne out. The mining edition of the *Record* will be well worth the careful study of those interested in mining in any part of the State.

THE first quartz mill ever built in Montana was put up at Bannock in 1863, says the *Mining World*. The mill was built with wooden stamps on which pieces of wagon tires and other old iron plates were used for shoes. This mill was intended to work gold quartz ores entirely. The first silver mill was unquestionably the old Pioneer, now owned by the Hope Company near Philipsburg. The pans for this mill were shipped by wagon all the way from San Francisco, and in crossing the Rio Virgin in southern Utah, the wagon and teams sunk in the quicksands, and the pans were buried there for several weeks until they could be dug out and raised by derricks.

SOME desirable changes are being made in the quarters of the State Mining Bureau. The library and offices are now much better lighted and more commodious than formerly. Mr. Cooper, the State Mineralogist, is endeavoring to induce the State Harbor Commission to allow him the use of the upper floor of the new ferry depot building at the foot of Market street for the housing of the Mining Bureau. He claims that, aside from the saving to the State in rent, there are many other advantages. A large proportion of those from the country who would be benefited by visiting the museum could do so much more easily if located there than in its present quarters.

THE announcement of any new discovery of mineral wealth is generally followed by a rush of people who have no business on the scene—men without experience or means. At Gleason, Arizona, lately some rich discoveries were reported, and now comes word that for miles about prospectors are in the hills, many of whom have come in without money, tools or food. A mining camp is the most hospitable place in the world, but it is rather hard on the honest men to be compelled to care for all these worthies. Already warnings are being sent out from Gleason for men without means to stay away. There is no demand for labor, and there are more prospectors than enough.

IN the Cienega placer fields near Santa Ana, Sonora, Mexico, which are some forty miles square in extent, the concessionaires—the Serna Brothers, Governor Corral and W. Loaiza—have some 900 men, mostly Yaquis, operating dry washers. Of these there are about 150 in operation, each machine being worked by five men. Some of the gold, especially the larger nuggets, is not turned over by the workmen with the returns, but in a roundabout way sold to the concessionaires, who are content to purchase them—their own property—having from long custom come to believe that the best way to get along. In the profits from the supplies given in exchange they manage to come out on the right side and ultimately get all the gold.

THERE has been published by the Victor Gold Mining Company of Cripple Creek, Colorado, a report covering its operations from February 15, 1893, to December 31, 1896, which will rank as one of the best productions of the kind, both typographically and as to the matter contained. It was prepared by Leo Von Rosenberg, of 35 Broadway St., New York. For the benefit of the shareholders in France it is printed in French, as well as in English. As to the data given, it appears that the total length of drifts run from February 15, 1893, is 7098 feet; depth of main shaft, 460 feet; product, 37,254 tons of ore: net proceeds from ore sales, $1,237,804.88; value of smelting ore per ton, $148.27; value of cyanide ore per ton, $8.24; operating expenses, $458,245.67; cost of producing each dollar, 37 cents; dividends paid to January 31, 1896, $705,000. The dividends are 70 per cent on the capital. Only sufficient ore is being extracted to pay the operating expenses and the monthly dividend of $20,000. A measurement of the blocks of ground now opened exposes over 32,000 tons of ore.

OF the prospector Sam Davis says in the *Chatauquan*: "To the brave and rugged prospector, with his cheap outfit of mining tools, his empty stomach, and his hopeful heart is due the rapid development of the West. At the tap of his pick the doors of nature's treasure vaults open; but their wealth is not for him. The stock sharks, the speculators and the promoters rob him of his interest, and the snow is no sooner sinking from the slopes of the foothills than the poor fellow is wending his course into new territory. He appears in the rocky fastnesses of the mountains, and, with no companions but his pick and frying pan, is lost to memory. Suddenly comes the news of another discovery, and a city rises like a pillar of flame in the wilderness. 'Lucky Bill has struck it rich,' gambled away his pile and pushed on. The bones of hundreds of the advance couriers of civilization blaze the path of progress in the West, or moulder in forgotten graves, while in their wake are teeming cities they have founded and the ceaseless murmur of the money-seeking multitude whose fortunes they have builded."

THE Grand Central mine, placed on the London market last year by the Exploration Company, has come in for considerable criticism. At the annual meeting of the company in London a few days ago, the following statement was made by the chairman: "Regarding the Grand Central mine of Mexico, our connection with which has subjected us to some adverse criticism, the recent results and reports are disappointing, we regret. The mine was reported upon by two eminent experts, on whose judgment, and Mr. Hamilton Smith's, we were entitled to act, and which judgment was confirmed by Captain Mein in November last. Knowing him so well, and appreciating him as fully as I do, I had no hesitation in adopting his views. Captain Mein was mistaken then, and he may be mistaken now, and the mine, judging from its past history and that of its neighbors, should again yield large profits. All I want to establish now is that, before joining others in this business your directors took all reasonable precautions." Now word has reached San Francisco that this week a strike has been made in the Grand Central that will make it worth more than it was estimated at by Captain Mein and others when it was purchased by the Exploration Company.

Practical Notes on Hydraulic Mining.*

NUMBER III.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE H. EVANS, C.E., M.E., General Manager Cons. G. Mines of Cal., Ld. Oroville, Cal.

To find the area of a flume or ditch with sloping sides, add the width at top and bottom (in inches) together and multiply the result by 2. This answer will be the area in square inches, which, divided by 144, will give the area in square feet.

Example: What is the area of a cross section of a ditch 48 inches wide at top and 26 inches wide at the bottom, with a depth of 24 inches? Answer: 48 + 26 = 74, which, × 24, = 1776, and this divided by 2 = 888 square inches ÷ 144 = 6.16 square feet.

To find the square feet of the cross section of a ditch or flume with sides sloping to a point at the bottom, multiply the width (in inches) by half the depth (in inches) and the answer will be area in square inches which divided by 144 gives area in square feet.

Example: What is the area of a flume or ditch 70 inches wide and sloping to a point at the bottom, with a depth of 36 inches? Answer: 70×18, or half the depth in inches, = 1260 inches, or divided by 144 = 8.75 square feet.

Carrying Capacity of Pipes, Discharge of Nozzles, Etc.—It is hardly possible to point out any portions of a hydraulic plant that are of more importance than pipes and nozzles, and in out of the way places miners have great difficulty in finding out the correct sizes of pipes and particularly the capacity of of same, especially with regard to quantities of water discharged through pipes and nozzles of different diameters, there being innumerable instances at the present day where miners do not know the pressure of water is only as the head, without any regard (neglecting friction and bends) to the size of pipes. For example:—A pipe line composed of 6-inch pipe, and another line of 40-inch pipe, with same fall or head will both give the same pressure. It was only a short time since that I was asked by a miner of some experience if he could not double his pressure by doubling the diameter of his pipe.

As an illustration, this fact is easily demonstrated by attaching the same size and kind of faucet to two tanks, one say of 3 feet diameter and 3 feet deep and the other as large as convenient, say 6 feet in diameter and 3 feet deep. Fill both with water to same depth, then after placing buckets of equal capacity under each faucet, turn both on at the same time. To the surprise of any person not acquainted with hydraulics it will be seen that although the larger tank contains four times more water than the smaller one both buckets will be filled at the same time.

It is well to thoroughly understand the principle of hydrostatics in building storage dams and reservoirs, remembering that there is the same pressure on the bank of a reservoir with water 3 feet deep and extending back for a distance of 10 feet, as there would be if the water dammed back ten miles, so long as the depth remained the same.

In reference to nozzles, they require great care in construction so as to be of correct form, in order that the water leaving them will be in a solid stream, instead of scattering and thus losing its power, which is the case with nozzles of improper construction. In order to get the best effect it is absolutely necessary that the head of the pipe conveying the water should be at least 3 or 4 feet under water in order to prevent any air getting into the pipe, which also causes the water to scatter when leaving the nozzle.

All pipe lines should be laid as straight as possible, or with curves having as large a radius as can be obtained, and it must be remembered that new pipes well coated will carry more water than old pipes that have been rusted inside; therefore allowance must be made accordingly. It is good practice to allow one-sixth the diameter of pipes under 6 inches, and 1 inch on all diameters over 6 inches.

The first thing necessary for the miner to do is to ascertain the fall available for the pipe line and its length in feet. Knowing this and the quantity of water he is going to use it is easy to determine the diameter of the pipe, always bearing in mind that in order to secure efficiency and economy in construction water should flow in the pipe at a velocity of not more than 3 feet per second. A few of the simple methods of determining the discharge of pipes are as follows:

First—To obtain the velocity, first multiply the diameter in feet by the effective head in feet and divide the result by the length of the line in feet, then take the square root of the product and multiply by 50; this will give the velocity in feet per second, and the velocity multiplied by the area of the pipe in square feet will give the quantity of water discharged in cubic feet per second, which, multiplied by 40, will give the number of miners' inches.

Second—To find the velocity in feet per minute, multiply the number of cubic feet of water discharged per minute by 144 and divide the product by the area of the pipe in inches. For example: A 11-inch pipe discharging 150 cubic feet of water per minute, the velocity would be 150×144÷95.03 (the area of pipe in inches) or 227.6 feet per minute, or 227.6×$\frac{2}{3}$=151.7 miners' inches.

Third—In all cases the pipe will require a funnel or bell-shaped entrance, and an additional head to put the water in train in addition to correct dimensions for overcoming friction, assuming of course the total head available be required. To obtain the additional head commonly termed the velocity head, a simple method is to square the velocity in feet per second and divide by 64.4 and then divide that product by 0.70. The answer will be the extra head in feet required.

We are told by some authorities that in cases where the length of the pipe exceeds 1000 diameters the head due to velocity and even bends may be neglected, but in practice I find it better to err on the right side and in no case neglect working out the heads due to those losses and including them in all estimates.

Another simple and approximate method of finding the velocity is by multiplying the number of miners' inches discharged by 11 and divide the product by three times the square of the diameter of the pipe. For example: A 10-inch pipe discharging 400 miners' inches; the velocity will be 400×11=4400, divided by three times the square of the diameter, or 3×100=300. Answer, 14.6 feet per second. By means of the same formula the number of miners' inches discharged through a pipe of a known diameter and velocity will be found as follows: Multiply the velocity in feet per second by 3 and the product by the square of the diameter, then divide by 11 and the result will be the discharge in miners' inches.

For example: A pipe with a diameter of 20 inches, discharging water at a velocity of 3 feet per second, the number of miners' inches discharged will be as follows: 3×3×400 (the square of the diameter) or 3600÷11= 327 miners' inches.

Fourth—A more complicated but accurate formula for determining the velocity per second of water in pipes is: 140 times the square root of R×S minus 11 times the cube root of R×S—where R is the hydraulic radius, which is found by dividing the diameter of pipe in feet by 4, and S the sine of inclination, which is found by dividing the total fall in feet by length of pipe line in feet.

This formula has been tested in a thoroughly practical manner by Mr. Gordon, the Government Engineer in New Zealand, and he found it could not be relied upon when calculating high velocities, as it gave too great a discharge, but with low velocities and small diameters of pipe, it was deemed fairly accurate.

(To be Continued.)

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African Mining Costs.

The annual report for 1896 of the Robinson Gold Mining Company, the greatest property on the Rand, South Africa, shows that 177,500 tons of ore was mined during the year, and it is estimated that the ore in sight at the end of December was 441,506 tons down to and including the tenth level.

During the year there were sunk 655 feet of shafts, 6267 feet of drifting done, 3384 feet of raises and 1542 feet of crosscuts. The costs of these works will be interesting to American miners for comparison. All expenses for 11,193 feet of drives, raises and crosscuts were £31,738 5s 7d, or at the rate of $13.79 per foot. Nearly one-third of this sum was paid out for explosives. This item, owing to the heavy charges caused by the Government monopoly, is out of all proportion to the cost in other countries.

The total cost of mining and milling and the rate per ton of ore are given in the following table:

	1896. Total.	1896. Per Ton Milled.	1895. Per Ton Milled.
	£ s d	£ s d	£ s
Mining, includ'g mine maintenance	110,747 11 5	12 5.75	8
Milling, includ'g mill maintenance	32,788 4 0	3 8.34	05
General maintenance	4,387 3 7	5.94	.74
General charges (see revenue acc't)	20,044 13 6	2 3.10	2.07
Cyanide expenses	14,769 12 1	1 7.97	5.82
Totals	182,737 4 7	1 0 7 10	1 0 7.16
Mine development	37,091 10 5	4 2.15	5 8.65
Machinery, plant and buildings	28,088 6 8	3 1.86	7.47
Totals	247,837 1 8	1 7 11.11	1 6 11.28

The following table will show the cost of cyaniding in one of the largest plants in the world. It is stated in the report that the main feature of the year's work in this line has been the saving of an additional 10 per cent. This, of course, will more than make up for the increase in cost. The percentage of extraction for 1896 was 73.8, against 63.89 in 1895:

	1896. Total.	1896. Per Ton Cyanided.	1895. Per Ton Cyanided.
	£ s d	s d	s d
Wages (whites and natives, includ'g food)	3,486 15 1	0 8.38	0 7.42
General supplies	1,268 9 0	0 3.05	0 2.76
Fuel and power	1,466 7 9	0 3.52	0 2.92
Cyanide, 54,371 lbs	3,371 8 6	0 8.10	0 9 88
Zinc, 22,485 lbs	383 3 5	0 0.87	0 0.66
Filling and discharging vats	4,813 8 4	0 11.56	0 9.51
Totals	14,769 12 1	2 11.48	2 9.05

The duty per stamp per diem was 4.06 tons, crushed through a 900-mesh screen. The cost per ton for milling 177,500 tons was about 90 cents.

The average number of employes for the year has been of Europeans 256 and natives 1606

Theories of Pan Amalgamation.

Written for the MINING AND SCIENTIFIC PRESS by E. HERLIGENDORFER, Durango, Mexico.

While pan amalgamation is a complete success for chloridized silver, it is but partially successful for the so-called free milling silver combinations with sulphur, antimony and arsenic.

What is the reason why raw pan amalgamation can never recover *all* the silver from sulphurets, not even from the most free milling silver mineral, viz., silverglance?

There is in the pan on one side metallic copper, precipitated from bluestone and at once amalgamated when quicksilver is present; on the other side, silver sulphide. The silver sulphide wishes to be combined with copper sulphide, and to satisfy this wish it undergoes a partial self-destruction by giving the greater part of its sulphur to the copper, which needs for saturation more sulphur than the silver; and just as much copper is sulphurized as the remaining silver sulphide wants to form a compound combination of silver sulphide + copper sulphide, while the greater part of the silver is amalgamated.

Raw pan amalgamation has only one bait to hold out, namely, metallic copper; and though the copper is aided in its electro-chemical action by heat, friction, brine, iron and quicksilver, it cannot be an inducement for the compound silver sulphide + copper sulphide, which is already satisfied with copper. The newly formed compound has become rebellious for the pan and will escape into the tailings; or in other words, only a limited percentage of silver can be extracted by the raw pan amalgamation of sulphurets.

Likewise will raw pan amalgamation have no inducement whatever for the silver sulphide contained in sulphuretted copper ores, and the inducement will not be strong enough for the silver sulphide contained in iron pyrites, zinc blende, etc., though iron and zinc sulphide are not quite so attractive for silver sulphide as copper sulphide is for the same.

We have the example that in a watery solution of silver sulphate the silver can be replaced by copper or iron, without leaving a rebellious balance. It is evident that raw pan amalgamation does not work in a similar way. Or could the copper, simply by its affinity for sulphur, take the place of the silver? Seeing the difficulty to chloridize the silver contained in the same free milling combinations with cuprous chloride, though silver has probably more affinity to chlorine than copper has to sulphur, it appears that an extra help is wanted to reach the object. Such an extra inducement is for raw pan amalgamation the predisposing power to form the compound silver sulphide + copper sulphide, which nature has also formed in several minerals.

The raw ore is frequently overloaded with sulphur, a part of which is in a firmer and another part in a looser combination with the base metals. The looser part of sulphur would destroy the quicksilver were the latter not protected by copper precipitated from bluestone. It is then obvious that more or less copper sulphide will be formed without the necessity to take the sulphur from silver sulphide, and that either all or a part of the silver sulphide will find the desired share of copper sulphide; and the result will be that little silver or none at all is amalgamated, because the free milling silver combinations have become rebellious.

The same will happen after imperfect roasting, when the roasted pulp contains loose sulphur, one part of which will resulphurize some silver chloride to form silver sulphide; but this silver sulphide will not be amalgamated as in free milling ore, because another part of sulphur joins the copper of the bluestone, to form again the rebellious compound silver sulphide and copper sulphide.

Most likely will antimony and arsenic form similar combinations with silver and copper as sulphur, but as antimony and arsenic have less affinity to copper, raw pan amalgamation will be less successful when antimony and arsenic prevail.

I also suppose that the Russell process works in an analogous way as raw pan amalgamation does, replacing silver with copper, but never completely, only so much of it that a rebellious or insoluble compound of silver sulphide + copper sulphide remains. After imperfect roasting, the Russell process as well as pan amalgamation will form a great deal of copper sulphide and silver sulphide. But the thoroughly mixing pan will, with detrimental result, favor the union of the two partners, while in lixiviation the silver sulphide cannot easily find the separately formed copper sulphide and remains amenable to the action of the extra solution. This explains the better results of the Russell process for all imperfectly roasted ore and also for raw ore overloaded with sulphur.

The chloridizing theory for raw pan amalgamation with cuprous chloride has been doubted long ago. Some gentleman who has the opportunity might oblige the profession by preparing copper amalgam in a separate pan from bluestone and quicksilver. When the copper amalgam has been well washed before using it, then, of course, any chloridizing idea

will be given up. I expect that pure copper amalgam will not only do all amalgamating work in pan amalgamation perfectly well, but the absence of iron chloride originating from bluestone will avoid much destruction of quicksilver and also the carrying away of silver and gold by foamy quicksilver. I hope, then, that copper amalgam may become an article of commerce, always to be used in pan amalgamation instead of bluestone.

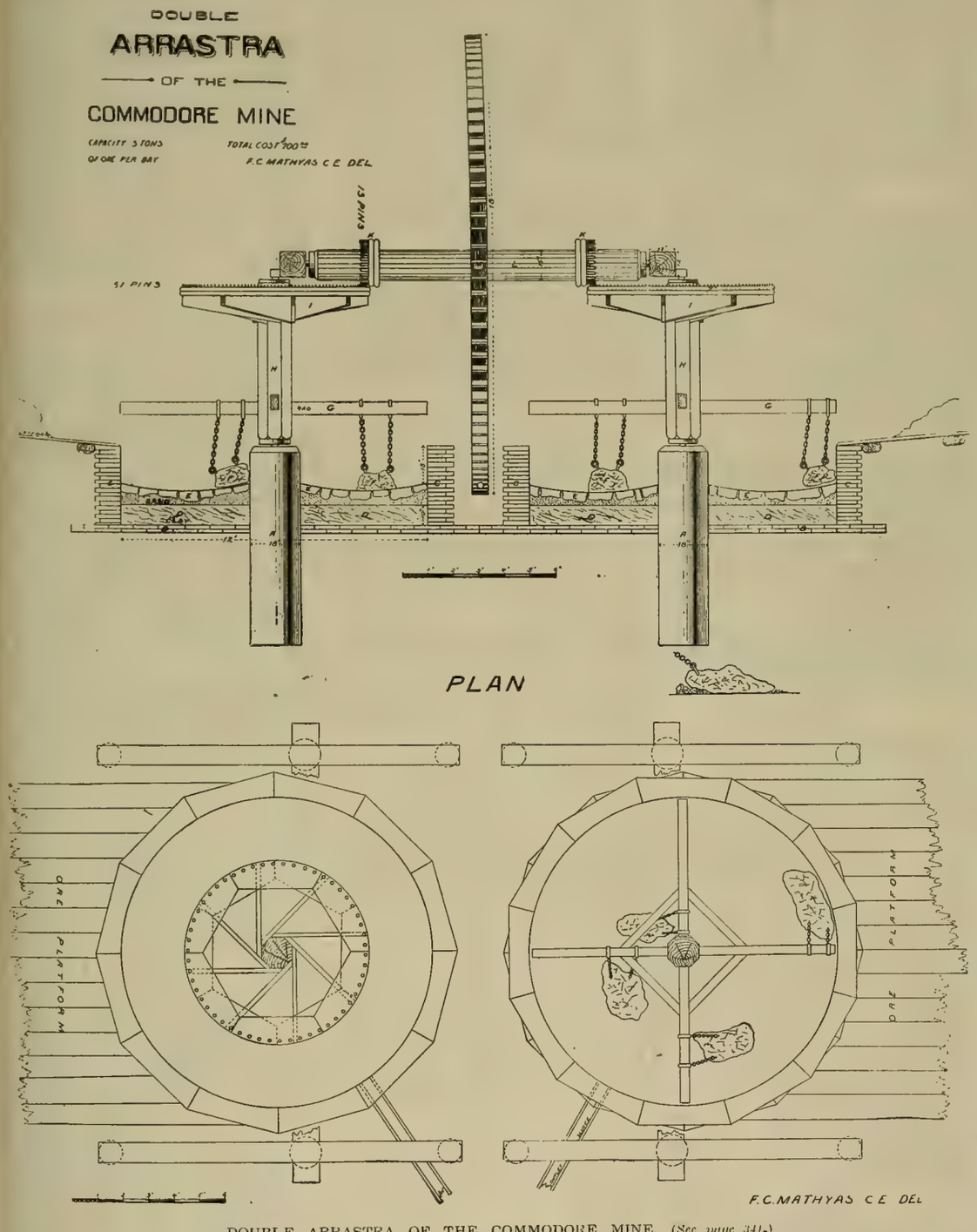
The Law of Mines.

Existing mining law literature will shortly be further enriched by an exhaustive treatise on the American law relating to mines and mineral lands and the acquisition of mining rights in lands of the public domain, by Hon. Curtis H. Lindley of San Francisco, who has devoted considerable time to the preparation of the work which is shortly to be issued. The publication is of timely value. No department of human industry is of more present prominence than the mining interests, and if from many fragmentary monographs and conflicting decisions a clear, systematic and comprehensive compilation of leading facts and authoritative information can be secured, its author will have conferred a benefit on the mining public.

That this desirable result will be attained seems evident by the conception of the scope and trend of the book, as outlined by Mr. Lindley in the preface. As he points out, there is no such thing as a national mining code. Indeed, the remark of Emerson, "law is only a collection of memoranda," is almost a just one when applied to our system of mining jurisprudence. The basis of mining law, as we understand it, is the common sense rules formulated by miners themselves in local organizations, tempered and directed by natural evolution from precedent and ancient custom and crystallized into the dignity of an accepted statute.

The introductory treats of the mining laws of foreign countries; chapter I of title acquired and rights conferred by location, the character of the tenure; chapter II the nature and extent of property rights conferred by lode locations; chapter III the same as conferred by placer and other locations; chapter IV perpetuation of the estate by annual development and improvement; chapter V forfeiture of the estate and its restoration by resumption of work, and so on.

Out of the great mass of mining literature the author seems to bring an orderly, philosophical and comprehensive collection of law applying to the rights and duties of the miner in the many instances where his interests and requirements are dimly defined and often misunderstood.



DOUBLE ARRASTRA OF THE COMMODORE MINE. (See page 341.)

An interesting memoir presented by Bertholet to the French Academy of Sciences describes the ancient copper mines of Sinai, which were in operation 5000 to 1200 years before the Christian era. Vestiges of these mines may still be seen near the coast of the Gulf of Suez. Two deposits were worked—that of Wadi-Maghera and, somewhat later, that of Serabil-el-Khadem. Both occur in sandstone, not in the porphyry which forms the main portion of the mountain. In addition to copper, there also occur iron ores and gypsum. Old levels are still in existence, as well as vestiges of furnaces, crucibles, slags, miners' dwellings, tools, etc. The ores comprise turquoise, a hydrosilicate of copper, and sandstones impregnated with copper salts. These appear to represent the surface alteration products, while the deep-seated pyrites deposit has not been touched. The ores must have been smelted with imported wood. The slags are precisely similar to those of the present day. The tools found are of special interest. They were discovered in the ruins of the miners' dwellings, and are of three kinds. The pick is of cast copper, containing no appreciable proportion of tin, but a great quantity of arsenic, which appears to have been intentionally added. The chisel is of very hard metal, a bronze very poor in tin, and free from arsenic. Lastly, the pricker is of copper, containing no tin, a little arsenic, and inappreciable traces of antimony. The presence of tin and arsenic in some of the tools, and their absence in others, shows that the ancient Egyptians understood the way to modify the properties of their metals at will by adding foreign materials. The Sinai mines were shut down 3000 years ago, owing to the poor quality of the ores, and also owing to the difficulties of transport.—London Mining Journal.

The Rand in 1896.

The following gives rather a gloomy outlook for the shareholders in the Rand mines in South Africa. It is from the London *Mining Journal*, and among other things shows that more money was spent upon the Rand than was produced:

The figures dealing with the mining industry are not altogether satisfactory, inasmuch as the yield per ton shows a decline of over 2 dwts. as compared with 1895. Though this might not appear a serious decline on other gold fields, it is on the Rand, and in the case of many mines would mean their absolute failure. This decline, when it becomes generally known, might sound a note of warning to many who had a serious intention of investing in South African mines, but we would warn and advise them not to take it too seriously. The total production of ore for 1896 was 1,339,952 tons. This is an increase of 304,631 tons over 1895.

The total production of Transvaal gold in 1896 was 2,497,946 ounces valued at £8,597,013.

The dividend list shows a distribution of £1,545,256 in dividends for gold mining companies on the Rand (including the Rand Central Ore Reduction Company) and £168,625 by collieries and the Consolidated Deep Levels. A total is given of the returns of the stores consumed by 81 companies, which shows the value of the stores to be £4,040,605. Some prominent factors in this total are: Machinery, £892,651; coal, £609,102; dynamite, £101,993; blasting gelatine, £439,671; gelignite, roburite, etc., £22,791. Candles to the extent of 119,135 boxes were consumed of a value of £76,526. Cyanide figures at 1,969,437 pounds, valued at £125,531; mealies, meal and forage at £338,845; timber and deals at £274,655; sundries at £427,527. While the consumption of dynamite has fallen in value from £117,126 in 1895 to £101,998 in 1896, that of blasting gelatine has risen from £297,828 to £439,671.

From the above figures it will be seen at a glance that the stores amount to an excessive sum. It is closely approached by the expenditure on labor, which is nearly £4,000,000. It is obvious, therefore, that there is still plenty of room for economy. The future prosperity of the field is absolutely dependent upon the practice of economy, and there is abundant scope for this in the reduction of wages. We are not alluding exclusively to native pay, but also to the remuneration paid to the white hands. It will also be seen from these figures that more money was spent upon the Rand than it produced—a fact which will surprise a great many. But this is not to be wondered at, inasmuch as it is the experience of nearly every gold field, and it is not to be expected that the Rand should prove an exception to the rule. The magnates of the Rand are still impressed with the necessity of retrenchment. One means thought to be very effective was direct cyaniding, but the experiments which have been carried out have not been a success. These trials have been made on the Village Main Reef, where 617 tons of ore was treated, estimated to give a yield of 80.2 per cent. The actual return, however, was no more than 64 per cent.

Mining Summary.

CALIFORNIA.

Amador.

Dispatch: The Butte Basin tunnel, which is being run on the Amador side of the Mokelumne river, a short distance from Big Bar bridge, has now reached a distance of over 1000 feet. There are about 850 feet yet to run to reach the point desired.

Mr. Petrie writes from Baltimore that he will soon open up and operate the Tripp and Roaring Gimlet mines on the Amador side of the river, between the electric plant and the Big Bar bridge. After he gets the mines under way it is Mr. Petrie's intention to begin to develop the Ibex property at Rich gulch.

In crosscutting for the Union ledge at the Weiland mine they have struck the ledge about 25 feet off the shaft. The ledge is from 4 to 5 feet wide and shows sulphurets and considerable good-looking quartz. The company will keep on crosscutting towards the gouge ledge with machine drills, and are to start drifting east on the Union ledge with hand drills to a distance of 1000 feet, after which they will continue sinking.

At the Amador Queen No. 1 the new hoist is completed and the mine is now equipped with hoisting machinery to go down 2000 feet as it is, and, by a slight change in the pipe line, to go down 3000 feet. Mr. Dye has finished enlarging the shaft from 8x4 to 9x5 feet in the clear for a distance of 150 feet. The new skip will hold one and one-half tons of rock and the water skip will bring up 400 gallons at a load.

Ledger: The managers of the Potazuba have decided to sink the shaft 200 feet below its present depth, making it 450 feet deep. At the depth of 100 feet drifts were run on the ledge over 100 feet north and 100 feet south, and mill tests were made which were satisfactory.

The South Eureka is now sinking a new shaft about 300 yards south of the old shaft.

Some people from Utah are negotiating with the owners of the Price mine at Plymouth with the idea of purchasing.

The Gold Hill, south of the Pocahontas, is being exploited by a company under a two-year bond. They have tunnel in 150 feet.

At the Oneida the old hoisting plant has been removed and the new machinery is being used.

W. H. Glenn is operating the Blue Gravel placer mine, in Rancheria district, under permission from the Debris Commission.

Republican: At the Argonaut graders are at work excavating for the mill.

At the Anita the north drift is being pushed ahead, with a long distance yet to go before they expect to reach the ore chute on the Shober ground, the outcroppings of which show so strongly on the surface. A crosscut has been run 175 feet immediately west from the shaft.

Butte.

Mercury: J. H. Challen and San Jose people have incorporated the Topaz Centennial mine, near Spanish Ranch, and it is now being worked, a bedrock tunnel being developed with good results.

Mr. Warner of San Francisco has bonded the Buchanan gravel mine for six months. He will run a tunnel to the channel.

Calaveras.

Chronicle: The work of sinking at the Esperanza mine still continues. The shaft is now down 460 feet. Good ore was encountered at the 400-foot level.

The California Exploration Company have placed a gasoline hoist upon the Gold Hill mine.

An air compressor and drill are to be put in at the Vair tunnel, on the Gobbi ranch.

At the Gwin work is prosecuted on the 1300 and 1400-foot levels, the drifts being driven north and south from the shaft at both levels. The miners are stoping and up-raising in all drifts and taking out rock sufficient to keep the forty stamps running night and day.

Mountain Echo: The Great Western mine, owned by F. Baumhogger, has been started up with a full force of men. The work of sinking the shaft is proceeding.

Work is progressing actively at the Carson Creek mine.

T. T. Lane has purchased the interests of Morgan & Smith in the Plymouth Rock mine at Jenny Lind.

Work will be resumed on the Keystone mine, owned by Demarast & Linxwiller, in a few days.

Operations on the Ghost mine have been suspended for the present, but will shortly be resumed.

Citizen: Men are at work at the Judith or Edna mine grading for the mill. The mill will be used for prospecting, and will be of four stamps.

Preparations are being made at the Vair tunnel, near Mokelumne hill, to utilize the water from the Mokelumne Hill and Campo Seco Canal Company's ditch for power to run the air compressor and machine drills which will be put in.

At the Burgess mine development work is progressing steadily. The force of men was increased the first of the week, making the number of men employed at the mine fourteen.

El Dorado.

(Special Correspondence).—The Big Sandy at Kelsey has reached 320 feet in the shaft. They will crosscut to the hanging wall and also run drifts both north and south. The outlook for this property is growing quite encouraging.

The new tunnel on the Blue Gouge has been run 213 feet through the country rock, locally known as granodiorite, and cut through the east wall (of a schist formation) and cut 6 feet into the ledge. Judging from the surface surveys, the distance through ledge matter to the west wall will be 280 feet. The tunnel will be 500 feet, with 650-foot "backs." This is 300 feet below an upper 300-foot tunnel, which also cut 280 feet of milling ledge matter. The ore in the new tunnel yields about $4 in free gold and a good percentage of high-grade sulphurets.

The old Jeffries mine is making a good showing and will soon have a 10-stamp (gravel) mill in operation. The property is less than a mile from town. The tunnel is 800 feet and the upraise 100 feet, on which the tunnel runs through a fair grade of gravel with indications of an approach to slate. The company expects to run the tunnel 650 feet on the bench.

The Star Light is stoping on the 270 (lowest) level and taking out rich ore from a good-sized ledge.

J. A. White & Co., prospectors, have three locations twenty miles east of town, on one of which they have sunk a 30-foot shaft and made several surface cuts. The footwall is slate and the hanging wall porphyry. The ledge is 4 feet on a fair grade of ore. The sulphurets run 15 per cent and assay $300 per ton.

S. K. Thornton, vice-president of the State Miners' Association, reached here to-day. He will canvass the county in the interest of the State organization, and he will meet with a warm welcome among the miners and the mine owners of old El Dorado county.

Placervil e, April 19th, '97.

Nevada.

Union: In Washington district French & Bell have commenced work on their mine at the head of Crombecker creek. In a week they will haul in ten 2-stamp mills, each of which will have a capacity of crushing four tons of quartz a day.

Superintendent Durbin has men at work removing the burned timbers and debris at the Milliken mine. The machinery is not damaged much. It will be but a month before operations are resumed.

Transcript: Dr. Dow and Dr. McMahon of San Jose, owners of the Le Du and Nancy Hanks mines in Maybert district, intend to work them this summer. Machinery is at Emigrant Gap and will be hauled to the mines as soon as the road is open.

Placer.

Sentinel: At the Belle Union, the property of Bayne & Abart, the ledge has an average width of 4 feet. It has been crosscut in numerous places from the tunnel. The ore prospects from $6 to $12 per ton.

Bedrock has been reached at the Occidental mine, near Iowa Hill, at a depth in the shaft of 280 feet. The company is now running a stope and have reached a point about 80 feet from the shaft.

Argus: The tunnel at the Dardanelles mine, the scene of the late accident, is being reopened.

Herald: Operations have begun at the Gray Eagle mine, and quite a force of men will be put on. When the mine is well opened up the force will be increased. It is said that no Chinamen will be employed.

Plumas.

J. H. Challen has incorporated the Golden Ancient Channel & Yellow Jacket. Development work will be commenced as soon as snow clears.

Work at Thistle Shaft will soon be resumed.

At the Sunnyside mine on North Fork preparations are being made to do a great deal of work in the way of developing the property. Advices from the East indicate a disposition to engage in work on a large scale. It is probable that some big contracts will be let.

San Diego.

Sentinel: At Banner camp the Ready Relief and Redmond mines are being worked by Baily Bros., with the usual force of ten men.

At the Ranchita mine the mill is a new 5-stamp. An engine has been added recently for hoisting purposes in place of the mule used previously. The main shaft is now down 240 feet.

The Owens mine at Julian, which is the property of the Owens Consolidated Mining Company, is at present working only ten men, as the mill is not running at this time. The main shaft is down 350 feet. There are two ledges, one north and the other south of the main shaft with crosscuts, about 450 feet worked at each level drifting. The ledge varies in width from 1 to 4 feet.

Union: The stamp mill for the United States Mint mine, near Warner ranch, has arrived at Temecula, and will be hauled to the mine.

Shasta.

Searchlight: Captain Roberts has suspended operations for the present in his Harrison gulch properties, pending such time as will be required to put in a better system of treating the ore. The mill heretofore used has permitted too much waste of value, it being estimated that not more than one-half of the gold has been saved.

Democrat: H. McDonald and Fitzmaurice of the Mountain Mines Company have left for the Copper City mining camp, where Mr. McDonald is interested in the copper fields of the district, which are known to be very extensive, and it is given on good authority that a syndicate proposes to erect large smelters, run a railroad to connect the Southern Pacific, and mine for copper on a large scale.

Searchlight: C. Jones, who recently struck a pocket on the east side of Muletown mountain, from which $800 has already been taken, is now erecting a small quartz mill on the property.

Desmond & Merchant are developing a promising claim on the Squaw-Clear creek divide, north of the Balakalala mine. A 3-foot ledge has been uncovered for a distance of about 200 feet, and the outcroppings show gold for a much greater distance.

H. Weiser, in opening his mine above the Miller property, above Shasta, struck a rich ledge, running high in gold value. The recent extensive demand for flux has set the miners of that section to digging.

W. H. Bergh and F. Cobrowsky, at the Early Discovery, near Shasta, have four men employed, and the development is showing up good property. A crosscut tunnel 250 feet long has tapped the ledge at a depth of 100 feet. It is the intention of the owners to put in a stamp mill in the near future in the place of the present crude arrastra.

Sierra.

Mountain Messenger: The mill which has been standing idle for some time at the Northern Belle mine, near Loganville, will be started up soon.

Owing to the heavy flow of water struck in the old works at the Prospect mine, in Slug canyon, it was deemed expedient to run a lower tunnel and also to drain the water encountered in the old works.

Work is progressing rapidly at the Bald Mt. Extension mine, the north tunnel being pushed ahead at the rate of 40 feet a week. It is expected that after running 200 feet farther they will strike the channel. In the old south tunnel gravel is being taken out which is paying very well.

Siskiyou.

Journal: The finding of rich ore in the extension of the Siskiyou, on Humbug, has aroused considerable interest in mining circles, especially among those who have ledges in that locality.

The Garrett mine, at Humbug Bar, which was purchased by a Chinese company last fall, is now in operation. It was found last year before selling out to the Chinamen that they had dumped an immense pile of rocks directly over the pay channel, which the Chinese began removing upon taking charge.

The Distlehorst & Barton dredger is now working at the David Collins place, below Oak Bar. They are gradually moving down on the Klamath, and will soon reach the mouth of Scott river.

The placer mine situated opposite Scott Bar, recently purchased by Mr. Garrett of Woodland, will soon be opened up.

The Seattle placer mine on Thompson creek is in active operation at present, and will no doubt prove richer than ever this season. It is under excellent management and has a splendid plant.

Thompson creek is about the liveliest section of the county now. The two large hydraulic mines, the Nanetta B. and the Seattle placer mine, employ a large number of men, all of whom make their headquarters at Nolton, on Thompson creek, while there are also numerous other smaller mines in operation in that locality.

The Eastlick Brothers' mine at Oro Fino is running full blast at present, there being plenty of water for the giants. This mine will be kept in operation until after the 4th of July.

Journal: The Eastlick Bros.' hydraulic mine at Oro Fino is running full blast now, with a bountiful supply of water. They have two giants in operation and expect to keep them going until July.

The Wright & Fletcher and the Gardiner hydraulic claims are also doing well at Oro Fino and expect to have fully as long a season as usual.

Trinity.

Journal: There is considerable activity in mining on the East Fork and vicinity this winter. A number of new placer mines have been opened and worked with good results. The work done on the old claims yield good returns. The quartz claims are being worked with good results.

Cannon & Hanley of French Gulch in a quartz location near Castella have a 20-foot ledge of free-milling ore.

Hedges & Pelletreau Sr. have sold the Highland placer mine, opposite Taylor's Flat, to Red Bluff men. The property comprises about seventy acres of gravel, with water right. The claim is a high bench and had been overlooked for years until the present owners took possession and began working the mine.

Tuolumne.

Democrat: At the Black Oak, operated by the Scott brothers, the main shaft is down past the 800 level and is being driven to the 900, where more crosscutting and drifting will be done. The vein at the 800 has a width of 14 feet, which is getting stronger with every shift. The quartz from wall to wall is high grade ore, though quite rebellious. A 10-stamp mill does the crushing at present, but ten more are being put in position as rapidly as possible. Ore is being shipped regularly to the Selby Smelting Works for reduction.

At the Dead Horse the main shaft is being driven another 200 feet which will give it a total depth of 1700 feet.

At the Lady Washington George McGillivray has a large force under Superintendent Fisher doing development work. A good body of ore has been struck and the outlook is favorable.

At the Confidence a new 20-stamp mill is in course of erection to take the place of the old fashioned one now on the site.

The California Exploration Company has the Belleview mine under bond, and will very likely take the property at the expiration of the time. One of the requirements is that the operators drive the shaft 200 feet deeper from the 800 to the 1000 level.

The main shaft of the Rawhide is nearing the 1100 mark, and sinking will go on till the 1300 level is reached.

The North Star and Black Warrior Consolidated has driven the tunnel in to a depth of 180 feet, and are breaking ground at the rate of 8 feet per day, with three shifts. The ledge will be tapped when 650 feet has been run, and then the big shaft started down on its 1000 feet trip. There will also be 200 feet of stoping between roof of tunnel and surface.

Independent: Dr. Redding of the Tarantula mine will shortly erect hoisting works.

The Jumper mine is having a new air compressor put in.

Sinking in the main shaft at the Mammoth mine has been continued and a new tunnel is being run.

Mapes & Peters are operating their gravel mine at the head of Woods' creek. Several other placer mines are being opened up in that vicinity.

Work on the Nervy mine, at Italian Bar, will be resumed shortly. The lower tunnel, which is being run to tap the chute is now within 20 feet of it.

NEVADA.

Silver State: Mining properties in Ione, Nye county, are receiving a great deal of attention from outside investors. Several pieces of property have been bonded. The mine owned by Bray, Bell and others is turning out regular shipments of gold bullion, as well as shipping concentrates that run high.

At Battle Mountain a number of mines are being worked and some paying well, notably the Morning Star at Dean, near Lewis, from which regular shipments of gold bullion are made.

Dayton *Times*: At Silver City the Taylor and Pollard mills are running steadily.

The Succor mine is producing good ore, and quite a force of men are at work. The Lager Beer mine is also looking well. Both of these properties are operated by the same company.

Men are at work in the Combination tunnel, running crosscuts and driving ahead.

The Oest is still producing good ore. A cleanup was made last week which yielded over $4000.

The old Silver City mine is being prospected under the direction of Col. Boyle.

E. Pedroli & Co. are putting up a steam mill near their mine.

White Pine *News*: The possession of the Chainman group of mines has passed from the old Chainman Company, and is now under the control of the new company, with Charles D. Lane of California at its head. It is quite generally understood that operations will be begun at once. A civil engineer representing Lane & Co. and an electrician are now on the ground looking over the situation, having in view the location of a mill site, etc.

Enterprise: The placer mines near Carlin are showing up splendidly.

Mason valley is experiencing a prospecting boom just now. Ledges carrying free gold, also copper ledges, are being discovered every day, and the hills are being scoured by ranch prospectors.

Battle Mountain *Nevadan*: Johnson and Clives of Salt Lake City, who have a bond on the Copper Canyon property, intend to make a shipment of about fifty or sixty tons of the ore as soon as it can be extracted and hauled to the depot.

Gold Creek *News*: The water has been turned into the ditch at the headgate on Penrod creek, and every headgate and valve is set ready for the rush of water from the melting snow that is expected any hour.

Silver City *Enterprise*: W. H. Newcomb is shipping two cars of iron ore daily from Legal Tender hill, almost within the city limits.

At Carlisle the new 10-stamp mill is about completed and will soon be running full blast. If the process of extracting the precious metals prove a success, a larger plant will be erected.

Pinos Altos will probably have the finest display of ores from any single mining camp at the Nashville exposition. The mine owners have all taken an active interest in the matter.

A. Hersberger is working twelve men on the Western mine. The ore is being reduced at the Stanley-Martin mill and producing good results.

Bell & Stephens have eighteen men employed upon their claim on the Pacific. The only work in progress is the running of drifts north and south at the 450-foot level. The ore body is larger and of better grade than ever before found in the mine.

The Treasure Mining Company is cutting out a station at the bottom level preparatory to resuming sinking on the main shaft of the Atlantic mine. The shaft is now 297 feet in depth and will be sunk 163 feet deeper, thus allowing for a sump of 10 feet below the 450-foot level, at which level drifts will be run.

At Mogollon the force upon the Maud S has been increased to eighteen men, all upon development work. New ore bodies have been encountered in two places in the mine, and, from present indications, there will be sufficient ore uncovered within ninety days to warrant starting the mill.

The Confidence mine is employing about fifty-five miners and producing its regular quota of seventy-five tons of ore per day, which supplies the mill at Graham, on Whitewater creek.

OREGON.

Baker City *Democrat*: Operations on the old Sanger mine will be commenced before May 1st. The Sanger mine has produced more gold than any other mine in eastern Oregon, with the possible exception of the Virtue.

Rogue River *Courier*: A 5-stamp mill is being set up on the Belding-Dowell ledge, on Green's creek, about five miles from town.

Cramer & Wheeler of Myrtle creek have purchased a quartz ledge on Galice creek from Henry Hutchins for $3000.

Placer men have about quit in the Dry Diggings country, as the water has given out. Some prospecting is being done for ledges.

Jacksonville *Democratic Times*: The Lance Mining Company of Foots creek will enlarge their plant next season. One giant has been in operation and more will be added. The flume being constructed from Rogue river, to

secure a dump, has been run into bedrock about 2000 feet from the river.

A. A. Davis of Medford will soon erect a mill at the ledge in Lane's Creek district, formerly owned by Scott & Lee.

Hull & Beck of Louse creek are running their placer mines on full time, with plenty of water and good prospects.

If this weather continues many placer miners will commence cleaning up. The water supply is diminishing in different localities.

A 200-foot working tunnel is to be run at the Barth-Signoretti mine, on Murphy gulch, to tap the ledge at a depth of 150 feet below the old shaft.

Dr. Hinkle's North Star mine, on the Sardine creek divide, is being developed, and is showing up well.

WASHINGTON.

Spokesman-Review: The Scotia Mining and Milling Co., on Toulon mountain, in the Colville reservation, has tunneled through 20 feet of ore at a depth of 200 feet from the surface, and arranged to put down a shaft 100 feet on the vein and drift both ways from that depth. The progress of work on the Scotia will be greatly facilitated by the addition of needed machinery.

North of Colville is a short chain of rugged hills, lying between Mill creek and the Colville river, which are now proving to be rich in mineral deposits. This section has long been considered worthless, so far as the existence of the precious metals is concerned, but small finds have been coming to the surface for some months, until now the hills are being thoroughly prospected, with good results.

At Marcus, in the Anaconda, on Kettle river, the shaft shows a solid face of ore for a width of 8 feet. The property will begin shipping ore at once.

BRITISH COLUMBIA.

In the Slocan, John Tingling has taken a bond on the Little Daisy and Golden, adjoining properties on Springer creek. The purchase price was $35,000. One year ago the same property was offered for $15,000.

The Nicola, Tremont and Osborne, Four Mile creek properties, have been sold to K. A. Roberts and A. T. Monteith of Rossland, for $25,000 for a two-thirds interest.

Representatives of the Porter-Watson syndicate, that has lately bonded the Arlington group on Lemon creek, will at once put a force of men to work on the property.

Ore exports from the Slocan made by the way of Revelstoke during March amounted to 334 tons, valued at $34,041.

A. L. Davenport has sold to R. E. Brown of Spokane his five-eighths interest in the Emerald Hill, adjoining the Silver Tip on Blue Ridge, about ten miles from Kaslo.

At Fort Steele at the North Star mine there are are several thousand tons of ore now at the landing awaiting shipment down the river, and about 500 tons at the mine ready to ship.

Several townsites have recently been taken up, among them the town of Kimberly, lying between the North Star and Sullivan group. Owing to its proximity to those mines, it bids fair to be a town of considerable importance. There will be another good town at Cranbrook. Where the big town of the district will be located it is difficult to say.

Word comes from Cascade that a strong syndicate has been formed to operate on Castle mountain. It has secured 19 claims at the foot of Christina lake, and will push development work as soon as snow will permit.

Spokesman-Review: A majority interest in the Maud S. and Ben Hassen, on the North Fork of the Salmon, has been bonded by the North Fork Mining Company, a Victoria company, for $25,000. James Stuart will immediately put a large force of men to work. A 200-foot tunnel will be run on the Maude S. to tap the ledge at a depth of 175 feet.

At Rossland the shipments for the week ending April 10 were Le Roi, 405 tons; War Eagle, 400; Iron Mask, 60; a total of 865 tons.

UTAH.

Salt Lake *Tribune*: The richest strike of ore that has been registered in Silver City the present season is that in the South Swansea. In the drift, 150 feet off the 350-foot level, native silver was uncovered that assays showed to contain thousands of ounces of silver. How much there is of this class of ore has not been determined.

The directors of the Utah and the Galena have under consideration a proposition looking to a consolidation of the property of the two companies, who are also reaching out for the Oriole, the Wildcat and Miner's Dream, all of which claims are regarded as extensions of the main vein. The workings of the Utah, which has been productive of $175,000, and those of the Galena, that has divided $71,000 among its stockholders, have already been connected, and as the ore chutes are but a few feet apart, one hoisting plant should be made to serve both companies.

Tribune: At Bingham the drift off the 450 level in the Crown Point has broken into vein matter at a distance of 196 feet from the shaft. Meanwhile Manager Pat Ryan continues sinking the shaft to greater depths, and at certain distances will crosscut to the vein.

The Luzerne having been absorbed by the Alma Gold Mining Company, work upon it will be resumed at once. The acquirement of this claim gives the company a group of three claims lying between the Swansea and the Sunbeam, that promise to become productive.

Bingham *Bulletin*: A bunk-house with accommodations for about thirty men was completed at the Fortune last week, and Manager Hill is expecting to soon have that many employed. The present force is fourteen working one shift.

At the Montezuma there will be out early next week a 100-ton shipment. Manager William Strickley has increased his force and is extending the main tunnel, which is now in 800 feet.

Manager Weir of the Highland Boy Company says that the contract for building the new mill would be let immediately.

There are now fifteen leases working in the Tiewaukee, and all in more or less ore, some doing well.

Tintic *Miner*: Last week shipments were as follows: From the Bullion-Beck mine, 25 carloads ore; Bullion-Beck mill, 5 carloads concentrates; Eureka Hill mill, 5 carloads concentrates; North Star, 3 carloads ore; Carisa, 5 carloads ore; Dragon iron mine, 2 carloads ore daily; Noon's iron mine, 1 carload ore daily; Centennial Eureka, 9 carloads ore; South Swansea, 8 carloads ore; Swansea, 5 carloads ore; Mammoth mill, 6 carloads concentrates; Ajax, 8 carloads ore.

The failure of the Centennial Eureka to declare its regular dividend is a great surprise, as that company continued the payments during the great depression, when hardly another company in the country was doing so. The fact that no dividend was declared does not indicate anything wrong at the mine, as it never looked in better shape.

Work has been commenced on the Gen. Logan mine.

C. L. Cope has sold the Silver Dollar claim to J. W. Lynch and J. W. Murdock, the stated consideration being $12,000, of which amount $500 was paid down.

Mercur *Mercury*: The discovery of ore on a new portion of the Sacramento, as reported last week, proves to be of great importance. The strike was made on the hill west of the mill, and a body of ore from 13 to 14 feet in thickness has since been developed, which gives average returns of $32.

The Cedar Valley Company will soon resume development.

Magnificent cinnabar ore is being blocked out in the south drift in the Overland.

The West Geyser strike is opening up exceedingly well, and large bodies of $11 ore are being blocked out.

It is estimated that there is already blocked out in the Daisy 13,500 tons of ore of an average value of $7.40 per ton.

State Line *Buzzard*: Prospectors who anticipate prospecting at State Line and vicinity can venture in about ten days, as the snow will have thawed by that time so as to not materially impede their progress. The route to State Line should be by Desert Springs. and provisions can be obtained at State Line as cheap as in Salt Lake, minus the freight; also, camping utensils and miners' supplies. The grass will be plentiful in the hills this spring.

The Ofer will make another shipment of high-grade ore shortly.

Hicks and Mosher are down about 30 feet on their gold claim, and are taking out ore which runs high in gold, which is visible in the rock.

The Rice Bros. and J. Lund are working on their claims and extracting some good gold rock.

The owners of the Confidence and Perseverance claims, situated ten miles north of State Line, will resume work as soon as the snow is gone.

Murphy and Higgins have resumed work on their Blueledge claim. They are in 100 feet, and expect to strike the ledge in 40 feet more.

Salt Lake *Tribune*: At West Dip in the Daisy the incline is now 270 feet deep and drifts are being run on the vein. The vein widens with depth and, while it now shows about 15 feet thick, it is believed that crosscuts running east and west would show that it is thicker than this. Superintendent Mayne has been making a leaching test on Daisy ore and finds that 95 per cent can be extracted in forty-eight hours.

At La Cigale the new mill will start out with a capacity for handling 200 tons per day, which will be increased as the needs demand. The mill will probably be completed within sixty days.

Mercur *Mercury*: The Mercur is reported doing better than at any period in its career.

The Geyser-Marion, since the interests of the two companies were pooled, is achieving excellent results, the latest shipment of cyanides reaching a total of $14,000.

It is expected that the Golden Gate will get to work on its mill and have the plant in operation before another winter.

IDAHO.

Idaho Avalanche: Work upon the Dewey crosscut tunnel being driven to tap the heart of Florida mountain is progressing steadily. A contract has been let for an additional 200 feet.

On the Nugget the leesees are rushing work upon the crosscut tunnel and are near the vein.

A hoist for the shaft in the Blain tunnel of the Trade Dollar is now enroute, and the vein will be opened to a greater depth. The mine is making regular and heavy shipments each month, and is producing more money than ever before in its history.

At the Golden State negotiations are in progress looking toward the settlement of all misunderstandings between the co-owners, and it is more than probable that work will be resumed upon the property within a very short time.

The contract for sinking the first 120 feet of shaft from the Idaho tunnel level in the Black Jack is well under way. It is expected that a hoist will be installed by the time this contract is completed.

Spokesman-Review: A strike of rich ore about three miles east of Porthill, on the Kootenay river, is creating considerable excitement in that section.

At Pierce the Pacific Placer Company has sold its property in Read's creek to a Chicago syndicate for $55,000.

At Lewiston large numbers of prospectors are outfitting, and they depart daily for the mountains. The season is late, and the snow is deep on the high ranges. It will be impossible to do any prospecting for a month, but many of them go in on the river bars to camp, and in the meantime they will use the rocker on the bars.

The Green Creek Mining Company, Limited, has been incorporated at Moscow to operate a group of thirty claims on the South fork of the Clearwater river, thirteen miles above Grangeville.

MONTANA.

The Alice Mining Company will develop the Valdemire to greater depth, and are making arrangements to put on a large hoisting plant to sink the present shaft deeper.

The hoisting engine formerly on the Glengarry, the property of the Montana Ore Purchasing Company, has been placed on the Nipper claim cornering on the Anaconda, where it will be used to sink the present shaft 200 or 300 feet deeper. This property was recently acquired by this company on bond for $235,000, with the privilege of exploring the same for one year.

At Deer Lodge there will be more ore shipped from the smaller mines about that camp this summer than ever before. A good many prospectors are at work opening up claims and some of the smaller mines are looking remarkably well. A new district has been opened up between Elliston and the Ontario. It comprises the territory known as Marcus Daly's old wood camp.

Inter-Mountain: The Boston & Montana Company will make a record for itself this year in the matter of production of ore. During the past few months the production has exceeded 800 tons of ore per day and within the past few days orders have been given by Superintendent Klepetko to increase the output at least 200 tons per day. For this purpose the working force at the mines is being increased.

It is reported in Marysville that the 50-stamp mill of the Montana Mining Company, Limited, will begin crushing Drum Lummon ore May 1. One hundred men are at work underground and large reserves of ore have been blocked out, since the two mills closed down last fall. The ore bins are about full and there is more ore in the mine ready to be lifted to the surface.

The Gold Belt properties at Empire, which were purchased about two years ago by Sam Word & Sons, have been started up under the management of Will Word, and forty stamps of the mill will be dropping on ore the latter part of the week. The Gold Belt when worked by an English syndicate called the Gold Leaf Company, produced nearly $2,000,000 in gold.

The Mayger brothers of the St. Louis Mining & Milling Company are hauling ore from their mine in Marysville to Trinity gulch, where they erected a new mill last summer.

The recent decision of the Northern Pacific people to build a branch of that road down the Ruby valley from Gaylord to Twin Bridges with a promise of a further extension of the line at a later period has given the mine owners around Silver Star, Sheridan and Rochester new hope.

WYOMING.

W. S. Ward, director of the Mining Bureau of the Denver & Gulf Railway, purchased of I. S. Bartlett, E. A. Stack and others the Blue Bird and Good Fortune mines at Hartville, paying $22,000. Heretofore ore shipments from the mines have been made by team for sixteen miles to the line of the Denver & Gulf. A spur will now be built to the mines and an all-rail haul secured.

During the past winter a number of mining properties in districts tributary to Laramie have been purchased by Eastern syndicates, who will commence active operations as soon as the season will permit. The American Gold and Copper Company of Chicago have purchased a small plant for the reduction of their copper ores in the Jelm mountain district, some twenty-eight miles southwest from Laramie.

A contract has been let by the Oregon Butte Mining Company for freighting 5,000,000 pounds of iron pipe from Rawlins. The pipe is to be used in connection with the hydraulic apparatus in working the placer mines of the company.

SOUTH DAKOTA.

Black Hills *Times*: The Durango Mining Company have commenced shipping 100 tons of ore, which will average better than $100 a ton in gold. This is a month's output, with a force of five miners, making the net output $10,000.

An option for two months, at $8500, on the Badger group of mines at Ragged Top, has been given to Eastern people.

NEW MEXICO.

Denver *Republican*: Despite the unusual snowfall which now covers northern New Mexico's mining district, there is now an unprecedented rush of miners and prospectors into the camps of Taos, Colfax and Rio Arriba counties, which border on the southern Colorado line.

On the Piedre Lumbre grant, in Rio Grande county, all sorts of sluicing, dry and wet placer devices have for years been tried on the gravel pits without avail. There has been of late considerable experiments that give promise of success in working the ground.

New Mexican: Within a few miles of Hillsboro there are many acres of gold placers. For several years a company, of which W. S. Hopewell, W. H. Bucher, W. B. Childers, J. T. McLaughlin, John A. Lee and others are members, has had several thousand acres of these placers located. For a year past some Pittsburg capitalists have carefully investigated the problem of working them and tested the gravel. These capitalists have now closed a deal for the placer claims, it is understood, paying $82,000 for them. The water rights have been purchased from W. S. Hopewell for $25,000, and water will be brought to the placers by a system of open ditches and pipes —about fifteen miles of the latter and about ten miles of the former.

COLORADO.

Denver *Republican*: At Cripple Creek the production from the Ingham last month was 350 tons of an average value of $80, and so far this month seven carloads have been sent out. The development is being kept ahead of the stopers in such a way as to guarantee steady production for several months.

The Franklin-Roby Company has shut down its Lillie in Poverty gulch and will, in all probability, start damage proceedings against the Moon-Anchor. The management claims that the water from the Moon-Anchor is allowed to flow down the gulch and fill the Lillie shaft.

The richest ore that was ever broken in the Anchoria-Leland is now coming from a new drift started west on the Maloney cross-vein from the first level of the big shaft.

The Maggie, on Howell hill, has been bonded to Boston parties for $35,000.

The Victor Mining Company has issued a circular in which it is said that for the past ninety days trouble has been experienced in marketing the third and fourth class ores (which comprise from 75 to 90 per cent of the tonnage) at the cyanide mill, more of these grades being offered there than they can handle and treat. The works are being enlarged, and within three or four months the increased capacity will enable them to handle all the shipments made them. They now have over 2000 tons at the mill awaiting treatment, and the ore bins at the mine are full. This necessitates an almost complete stoppage of mining for the present. During the past four years the company has paid out $800,000 in dividends, at the rate of $20,000 a month.

At Central City, at the Fisk mine, 100 men are working, mostly on tribute, and all of them are making day's wages and a good many are making good money. Most of the work is being carried on in the upper levels and in the day shift, while at night timber men are busy putting in new timbers in the shaft below the 800- oot level, and President Conie of the property says they are anxious to get the water out so as to reach the 900-foot level (the bottom of shaft), when the force of men will be increased.

At Silverton the Silver Lake is producing 225 tons daily; and, as soon as the mill can handle it, 500 tons daily will be forthcoming.

The Victoria Company have been opening up new ground this winter and enough ore has been opened to keep the mill running all summer.

Judge Terry, who took back the Sunnyside mine, after a company had spent $50,000, and threw it up because they could find no ore, has already broken enough mineral to supply his mill this summer, and has a 15-foot breast of ore that is of better grade than any ore previously discovered.

The Ariadne, owned by the Congressional Company, has been developing all winter, and a firm body of copper and silver ore has been opened at a depth of 400 feet, while a discovery of rich tellurium ore has been made on the surface.

The Pearl, on Cement creek, which has one of the largest bodies of pyritous ores in the district, but too low grade to ship, is being worked by Beaver & Co. under lease.

J. M. Callow, general manager of the Golden Horn Consolidated Company, in Ice Lake basin, is on his return from London, where he has been attending a meeting of his company. He is accompanied with $60,000 with which to build a tramway from the mines to the mill, and also to add a steam plant and air compressors.

A Chicago syndicate has bought the Jersey mine, overlooking the town of Eureka, and has let a contract for 100 feet of drifting

Samples of ore from the new strike in the Ajax sustain all that has been claimed for it, and are identical with those that were obtained from the Mammoth at a corresponding level several years ago. The silver expresses itself in the form of a sulphuret, and that the percentage of lead is high is made known through the presence of galena.

ARIZONA.

Phœnix *Republican*: The Copper Queen Company of Bisbee has completed a deal with the Detroit Copper Company of Morenci whereby the former company acquires a controlling interest in the Morenci properties. The Copper Queen Company has been a minority stockholder in the Detroit Company.

The Kassar Gold Mining Company has been reorganized, and the properties will be worked in the future by the new company, which owns the Kassar and Diamond H gold properties in Lost gulch.

The Duquesne Mining Company are adding new machinery to their plant near Nogales.

The output of the Old Dominion Copper Mining and Smelting Company at Globe was the largest last month in the history of the company's operations.

New reduction works are to be erected at the Holland mine in Washington camp.

Prescott *Journal-Miner*: J. K. Murphy and W. T. Hutchinson are working the Gold Bug mine with excellent results, taking out good shipping ore.

Parties have taken a lease on Powell's Dark Horse and Right Bower claims, silver properties, and are taking out ore from them. The vein is 7 feet wide.

Men are at work on the Texas Chief and Texas Prince, on which there is a tunnel 100 feet long. The ledge is from 2 to 3 feet wide and the ore carries gold and about 33 per cent in copper.

Republican: An option has been obtained by a Pennsylvania company on the Peabody mine at Russellville, in the Dragoon range, in the southern part of the territory. The Peabody has been dormant for some time.

Electrical Progress.

Heating a Building by Electricity.

Written for the MINING AND SCIENTIFIC PRESS by ORRIN E. DUNLAP.

The central power station of the Niagara Falls Power Company, at Niagara Falls, is probably the largest building in the United States, if not in the world, that is heated entirely by electricity. Despite the large proportions of this structure, no heat other than electricity is employed to make it comfortable during the cold months. The power house is 195x60x50 feet.

The power house is divided into the dynamo room and the office quarters, making necessary the use of two kinds of heaters. All the heaters in the office portion of the building are on a secondary 100 volt circuit, which circuit is fed through converters which reduce the voltage from 2000 to 100. The use of a high potential circuit through the offices would necessarily entail danger, and it is for this reason the low voltage was adopted. The office section is two stories in height, and in it there is about 175 H. P. in heaters. The current devoted to heating the offices is taken from the primary of the circuit which feeds the street railways about the city of Niagara Falls. In the office are two 7 H. P. heaters, or a total of 14 H. P. in this room, 20x15x10 feet high.

In the dynamo room, which is quite spacious, the heaters employed are of different pattern. Instead of being placed on the floor, they are fastened on the wall of the room about 15 feet above the floor. There are fifteen of these heaters in the dynamo room in circuits of five each, each circuit being capable of taking up 200 H. P., but it never yet has been found necessary to put all three circuits in service, two of them answering every purpose. The current used for heating purposes in the dynamo room is taken from the bus bars, and carried on No. 4 covered wire. As this current is taken direct from the 2200 volt circuit, and as each heater takes up about 40 H. P., it is apparent that to install converters to convert this power down to 100 volts, the voltage used in the office portion of the building would be expensive. All the heaters in the dynamo room are of simple construction, being made of two circular rolled iron plates ⅛-inch thick and 24 inches diameter. Bolts hold these plates 4 feet apart, one above the other. In each plate there are twenty-eight holes, the diameter of each hole being half an inch. Each hole contains a porcelain insulator; through these insulators No. 6 wire is strung. There are thirty-eight coils, each 1½-inch in diameter, the distance between convolutions being twice the diameter of the wire; the resistance of the heaters will take about 65 amperes at 440 volts, so that each five heaters in series will consume 2200 volts at 65 amperes.

In heating the dynamo room and the office portion of the power house the maximum amount of power used is 430 H. P., not taking into account the heat from the dynamos, an important factor, so far as the dynamo room is concerned. Three dynamos, each of 5000 H. P. capacity, are now in use in the dynamo room; but, as a general thing, only two of the machines are operated at the same time. Were each of the dynamos run so as to generate 4000 H. P., instead of at its full capacity, and 3 per cent of this power was lost in heat, which is a fair estimate, each of the two dynamos would contribute 120 H. P. toward heating the dynamo room, or from the two machines 240 H. P. in heat would be the result. By adding this 240 H. P. to the amount of power consumed by the heaters, it will be seen that nearly 700 H. P. is consumed in heat in the building.

The Niagara Falls Power Company have found their electric heating service very comfortable, but this does not denote that electricity will come into general use for heating purposes. The company are fortunate in having a large amount of cheap power, but, despite this fact, the electrical heating of their power house is a luxury, and one which few people are rich enough to enjoy. To the subject of electrical heating P. M. Lincoln has given considerable thought and study, and his views of the future of it are given in these words: "I do not think electric heating will ever come into general use. You can look at it in this way: It takes a great deal of power, comparatively, to make a given quantity of heat. Suppose a man was going to buy current enough to heat his house. Every form of heater has 100 efficiency. In an incandescent lamp all of the power is ultimately converted into heat and if a man were to put in enough incandescent lamps to heat his house, you can imagine what his bill would be at the end of a month. That is the only proper way to look at it. When we get electricity direct from coal, it may be used for heating. By far the most economical way to use coal for heating at present is to burn it, and not transform it into electricity by the present methods. Yes, I think the time will come when they will get electricity direct from coal—not direct from coal itself, but possibly from the products of coal. The effect depends upon the efficiency of the apparatus. We now get electricity from coal, but we have to go through a circuitous method. Electric heating may be advantageous for some particular purposes, such as heating soldering irons, where the heat must be constant. Electric heat in application to cooking may become popular, because it does not take much heat to cook, and very little heat would be wasted, where by the ordinary method considerable is lost."



DYNAMO ROOM OF THE NIAGARA FALLS POWER CO.'S CENTRAL STATION, SHOWING HEATERS ON WALLS: LARGEST ELECTRICALLY HEATED BUILDING IN THE WORLD.

Independent Driving of Machines by Electric Motors.

The advantages of independent driving of machines in any shop—that is, without the use of the traditional long lines of shafting—are never so well appreciated as when figures are available designed to show how much power is ordinarily used up in simply turning the shafting—in the friction of the transmission between driving and working points. A good many experiments have been made in the past to determine what this waste amounts to, and the results nearly always have indicated tremendous losses, relatively speaking. Still, one is not quite prepared for the figures given in a paper on the subject recently presented before the American Society of Mechanical Engineers by Prof. C. H. Benjamin. The trials of which they are the outcome were made at sixteen different establishments, with horse power totals ranging from 8 to 400, and with percentages lost in friction from 14½ to 80, the average friction loss amounting to over 55 per cent. These figures, it is proper to add, include, in every case, the friction of the engine itself, but even if a liberal deduction be made for this we have still a formidable reminder. What a fruitful field there is here for the electrical engineer! While small steam engines are used in some cases for driving single machines, and form a part of them, it is to the electric motor that we will eventually be indebted for a wider application of the independent driving system. There are a few shops—models in their way—where this system is in use, and has been for several years, and year by year fresh proofs are given of its manifold advantages. In these shops machine tools of all kinds, traveling cranes, elevators, each has its own motor, big or little, and the line shaft, the countershaft and the multitude of pulleys are, indeed, relics of a past regime.—Cassier's Magazine.

Scientific Progress.

A New Power of Air.

C. E. Tripler claims to have discovered a new power which, according to him, is going to revolutionize transportation and manufacturing. It is liquefied air. How he liquefies air he will not tell. It has been done before, but in small quantities in scientific laboratories, but never commercially. When liquefied, the air is at a temperature of 450° below zero, on the Fahrenheit scale. It boils or vaporizes again at 210° below zero, and it is from the expansion consequent upon this vaporization that Mr. Tripler obtains his "power," which is transmitted through an engine exactly as the power generated by steam from boiling water is transmitted. It is possible, however, he declares, to obtain a pressure of 2000 pounds to the square inch at a temperature of 200° below zero, and at practically no cost, from liquefied air, while to obtain 150 pounds of steam a temperature of 360° above zero is required and the consumption of large quantities of coal. It can be seen that if Mr. Tripler's contention is true all ideas of transportation and manufacturing must be readjusted.

The most remarkable claim is yet to be told. Mr. Tripler declares that his liquefied air in boiling, or changing to vapor again, absorbs the heat in the surrounding air so rapidly that it in turn is liquefied and flows into the reservoir, which in this manner is always kept supplied. That is, once the apparatus is charged with a supply of liquefied air it feeds itself, and will practically run forever without any cost for fuel. Mr. Tripler declares, too, that there is no loss of power in this process. He says he has set up one of his machines at the works of the American Air Power Company, in 129th street, New York City, and will soon give an exhibition of its operation. In appearance the apparatus resembles an ordinary barrel placed above a small engine. The interior of the barrel is lined with a thick coating of felt or other non-conducting material, and is filled with a network of pipes, somewhat like the condenser in a distillery. In the bottom of the cylinder is the tank containing liquefied air. The method of operation is Mr. Tripler's secret.

Longevity in Southern Latitudes.

Because in tropical countries more decayed vegetable matter is found, and in consequence more miasma, the idea has become popular that only vigorous health and long life are likely in northern latitudes, where frost now and then asserts itself. The fact that humanity matures much earlier in tropical climes seems to warrant the conclusion that it must necessarily perish much earlier. Dr. Luigi Sambon of Rome attempts to put these popular impressions to sleep by an elaborate exhibition of statistics. He doesn't contend that the warmest climate is most suitable to a man, under the conditions of modern civilization, but he remonstrates vigorously against the idea that a cold and variable climate is the most conducive to the physical and intellectual improvement of the human race. While northern climates may produce stalwart frames, statistics show that they do not conduce to longevity. In proof of his position, the doctor cites the fact that the average Arab outlives the average Esquimau by not less than twenty-five years. He shows that the people who live along the unhealthful coasts of Central and South America survive the inhabitants of the higher and cooler altitudes of the interior. He shows also that the Hindus, who often reach puberty as early as nine years, live to a surprising old age. The inhabitants of the southern countries of Europe are found to live much longer than those of the northern latitudes. To illustrate, in England in a population of 27,000,-

000 there are but 146 centenarians, while in Spain with a population of but 18,000,000 there are 401 centenarians.

Science of the Mosquito.

There are four truths respecting the mosquito which modern science has established:

First—A mosquito cannot live in air free from malarial poison. Untainted air has the same effect on him as a healthy community on a doctor. It deprives him of patients, and he must go to less favored localities to practice his profession.

Second—The lymph, which flows through an automatic valve when it inserts its proboscis, contains a modified germ of the malarial fever; and, according to the well-settled law of inoculation, the introduction of the weak germ renders harmless a subsequent attack by the strong germ.

Third—The mosquito never swallows human blood. It cannot. The fact that its body becomes discolored and swells, while probing, is caused by the discoloration of the lymph in contact with the blood and the muscular effort of inserting the probe.

Fourth—A mosquito will never insert its lancet in a person not susceptible to an attack of malaria. In this respect its sense is more accurate than the most skilled and experienced pathologist. This also proves not only its unerring instinct, but that it never wounds unnecessarily. Its thrusts are those of a skilled and human surgeon.

THE analyses of Berthelot not only show that the Chaldean weapons, ornaments and tools of 5000 or 6000 years ago were of pure copper, but that iron, silver and gold were known. The copper age preceded that of bronze, which appeared later in both Egypt and Chaldea. It is further noted, moreover, that the form of hatchets with handles, the processes of manufacture, and even the practical uses, were the same for the pure copper hatchets of Chaldea and the prehistoric hatchets of Europe.

Mechanical Progress.

Subaqueous Pipe Tunnel.

E. F. Sanford, Merced, Cal., has patented a subaqueous pipe tunnel, designed to be a solution of a difficult engineering problem. The invention relates to the class of pipe tunnels or conduits for any purpose, such as the conveying of liquids or gases, or the transportation of messages and goods, or the passage of vehicles, such tunnels being laid under water to rest upon or in the bottom. It consists essentially of flexibly jointed sections; a continuous flexible line secured to each section and crossing the joint so as to connect them together; coupling sections telescoped in the adjacent ends of the main section, and of sufficiently smaller diameter to permit the main section to bend out of line; bands of flexible waterproof material encircling the joints exteriorly, and fastenings on the main sections consisting of fixed and movable jaws which engage the continuous cable which flexibly connects the sections together. In conjunction with these are controllable nozzles in each section with pipes leading thereto, whereby water may be introduced and ejected against the bottom so as to adjust and grade the line of the tunnel or conduit.

The invention is deemed by the inventor to be applicable to any river or body of water where a bridge would be a hindrance to navigation or where the nature of the soil is such that a bridge foundation could not be made without great expense. The estuary between Oakland and Alameda could, in his judgment, be crossed by a tunnel of this description at an expense not greater than that of a bridge. If the practicability of laying such a tunnel over a short distance were established, longer ones would presumably follow. The accompanying illustrations give a good idea of its practical structure and operation.

Fig. 1.

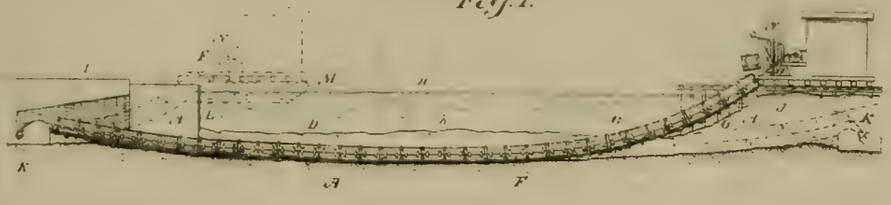


Fig. 2.

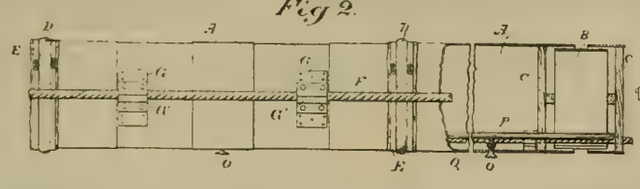


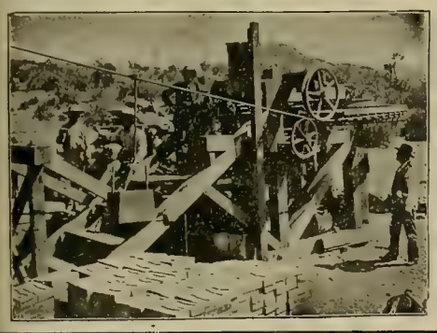
Fig. 3.



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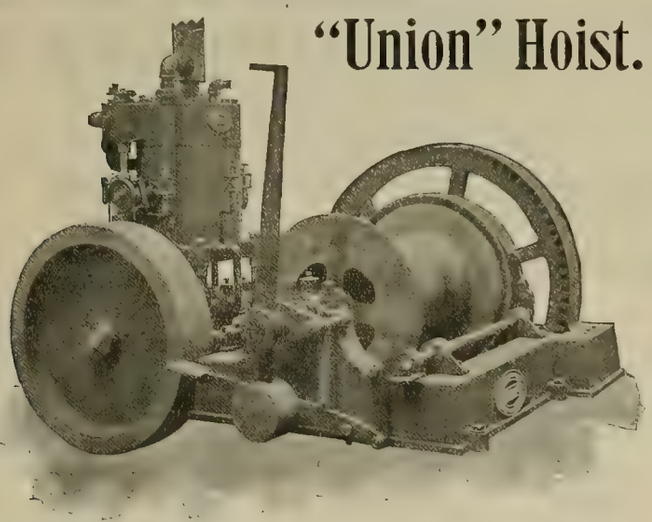
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Coast Industrial Notes.

—There are 151 creameries in California.

—A starch factory is building at Port Costa, Cal.

—Work has begun on the King's river bridge by the Valley road.

—The California Asphalt Co. is about to build a refinery at Ventura, Cal.

The transfer to the Southern Pacific of the New Mexico and Arizona and Sonora railways will be made May 15.

—The Electric Power Company is considering the question of building an electric railway from Grass Valley to Nevada City, Cal.

—The thirtieth Industrial Exposition of the Mechanics' Institute will open at the San Francisco Pavilion August 17th and close September 18th.

—Two guns, each weighing 115,880 pounds, 45 feet long and throwing a 1000-pound shot, will be mounted at Lime Point and Fort Point, San Francisco harbor, next month.

—The Spokane & British Columbia Telephone Company have received twelve tons of copper wire from San Francisco. This will string 144 miles. Within a month Rossland and Spokane will be connected.

—The Manufacturers' and Producers' Association is engaged in a present effort to have freight rates from San Francisco and Eastern points reduced to the amounts now being paid by Eastern shippers to this coast.

—San Diego, Cal., proposes a contract for the development of a supply of water which will impose a municipal debt of $1,500,000. The proposal to contract another $100,000 of debt for an electric light plant is not favorably received.

—In '96 the Chino, Cal., beet sugar factory grew 7000 acres of beets, producing 64,000 tons of beets, an average of 2286 pounds of crude sugar per acre. The net profit to the factory was about $240,000. The average return per acre to growers of beets was $33.75.

—The grade on the Sierra Railroad is now finished to Tulloch's ranch, and within a few days the grade will be complete to the Emery ranch. Two large trestles must be constructed at once—one at Tulloch's and one on the McKinnie ranch. A large force of men will be put on the rock work in the mountains in a few days.

—The Southern Pacific Company is considering the closing of the sixty-mile gap in the coast division. There will be required twenty-seven iron bridges in this distance. The cost of building the sixty miles will be about $2,500,000. The coast route will not shorten the distance by rail between San Francisco and Los Angeles; it will be 488 miles as against 482 by the San Joaquin Valley route. At present it is 22½ hours, and this will be cut to 17.

—The line of boats from Golden, on the C. P. R. R., down the Columbia, with that from Jennings, on the Kootenay river, north into the Fort Steele country, has been consolidated. The combined concern will be known as the International Navigation Company. It is a branch of the C. P. R. R. service. There are already five steamers on these routes, and the sixth is building. The new company has one contract to carry 4500 tons galena ore from the North Star mine to Jennings.

Recent California Mining Incorporations.

Logan G. M. Co., S. F.; J. C. Young, D. Hughes, W. Johnstone, J. J. Scoville, G. L. Brown; capital stock, $500,000; $250 subscribed.

Behemoth Con. G. M. Co., S. F.; D. A. Donelson, A. T. Sherwood, J. B. Whitney, C. Williams, G. T. Emery; capital stock, $600,000; $5,000 subscribed.

Caro M. Co., S. F.; F. S. Samuels, J. L. and F. L. Mudge, I. Stewart, J B. Smith; capital stock, $250,000; $500 subscribed.

Jupiter M. Co., S. F.; B. J. C. and A. O. Wendt, I. Cantour, V. Pouclet; capital stock, $10,000,000; $2,500 subscribed.

Big Ledge Mining Company, San Bernardino. Directors—S. Theis, Perry; M. Peacock, Los Angeles; C. B. Morris, San Bernardino; capital stock, $100,000; subscribed, $21,040.

National Con. M. Co., Redding, Cal.; capital stock, $1,000,000; G. Schmitt, G. F. Volz, C. Rehn, C. Wollpert, J. Scharff.

Recently Declared Mining Dividends.

The Morning Star Mining Company of Iowa Hill, Cal., has declared its seventy-sixth dividend of $5 per share.

Swansea, Utah, $5000; payable April 20th.

South Swansea, Utah, $7500; payable April 19th.

Geyser-Marion, Utah, $9000; payable April 21.

Rambler-Cariboo Company, British Columbia, $20,000; payable April 15.

Mercur, Utah, Mining Company, $25,000, April 20. Other Utah mining company dividends are: Geyser-Marion, $9000; Swansea, $5000; South Swansea, $7500.

Anaconda Copper Mining Co., Montana, $1,500,000, a total of $3,750,000 to date.

Anchoria-Leland M. Co., Colorado, $6000; April 15.

Calumet & Hecla M. Co., Michigan, $500,000; April 23.

Portland M. Co., Colorado, $30,000; April 15.

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Personal.

CHAS. UREN of Grass Valley, Cal., has gone to Mexico to examine some mining property.

ALBERT MALIMAN of Grass Valley, Cal., will take charge of some mining operations in northern China.

LIEUT. PEARY, of Arctic fame, has been transferred from the New York navy yard to Mare Island, Cal.

R. CAVILL has returned from South Africa and will manage the Poorman Gold Mines, Ltd., at Silver City, Idaho.

J. F. MCDONNELL of Virginia, Nevada, has organized a branch of the Western Federation of Miners in Tuolumne Co., Cal.

JESSE MILLER has been appointed superintendent of the Scotia Mining and Milling Company on Toulon mountain, on the Calville reservation, Washington.

LOUIS WILLIAMS has been appointed superintendent of the Detroit Copper Company at Morenci, Arizona, control of which was lately acquired by the Copper Queen Company.

JOHN HAYS HAMMOND, resident consulting engineer in London of the Consolidated Gold Fields, returned to England last week from South Africa. It is his intention to return to California shortly.

HAMILTON SMITH, who has long been managing director of the Exploration Company of London, which he and De Crano founded, has, owing to want of time, given that position up, but remains in the board of directors.

APPARATUS

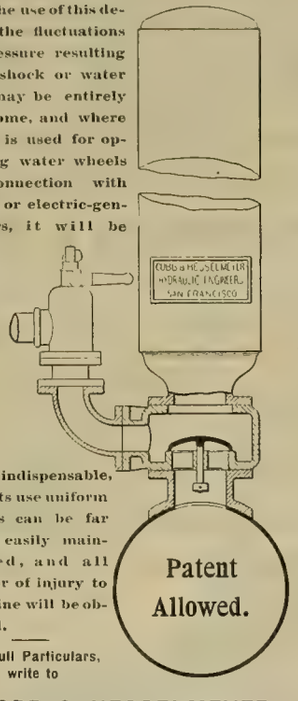
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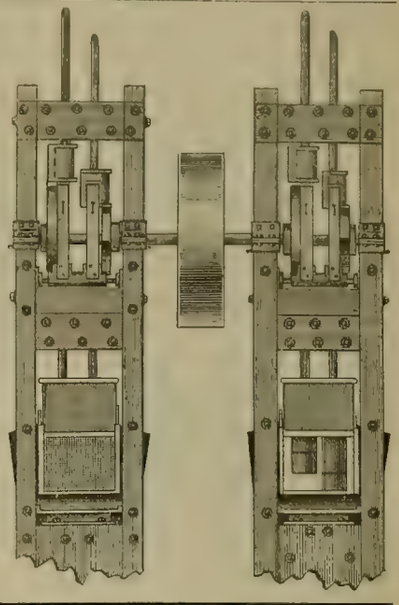
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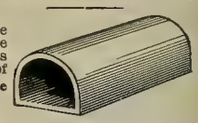
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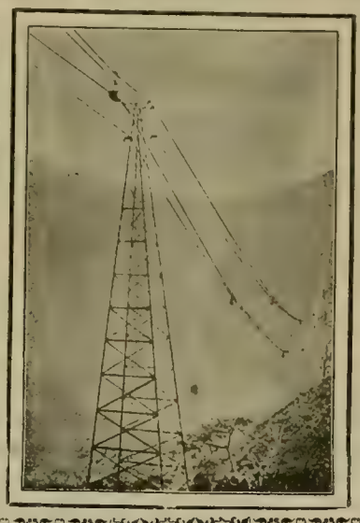
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Over Seven Hundred lines in operation.

Spans up to Two Thousand feet and more.

Highest Awards at World's Columbian Exposition.

Catalogues sent on application, giving full description and details.



Otto Aerial Tramways

Give the best working results in every case, and never-failing satisfaction.

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Be sure you investigate the Otto Tramway before purchasing.

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FRASER & CHALMERS,
Manufacturers of the
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"CRACK PROOF"
PURE RUBBER BOOTS
Are the CHEAPEST because
They Are the Most Durable.

BEWARE OF IMITATIONS.
See that the heels are stamped
"Union India Rubber Co. Crack Proof."

BEST QUALITY
Belting, Packing and Hose.
Gold Seal, Badger and Pioneer.

Manufactured only by
GOODYEAR RUBBER CO.
R. H. PEASE, Vice-Pres't and Manager,
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THE PELTON WATER WHEEL,
EMBRACING IN ITS VARIATIONS OF CONSTRUCTION AND APPLICATION
THE PELTON SYSTEM OF POWER.
In simplicity of construction, absence of wearing parts, high efficiency and facility of adaptation to varying conditions of service, the **PELTON** meets more fully all requirements than any other wheel on the market. Propositions given for the development of water powers based upon direct application, or
ELECTRIC TRANSMISSION
Under any head and any requirement as to capacity.
CORRESPONDENCE INVITED. CATALOGUE FURNISHED UPON APPLICATION. ADDRESS
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121 and 123 Main Street, - - - - - San Francisco, Cal.

THE GOLD and SILVER EXTRACTION COMPANY, OF AMERICA, LTD.
CAPITAL, - $550,000.
The Original Cyanide Process.
SIMPLE. RELIABLE. ECONOMICAL.

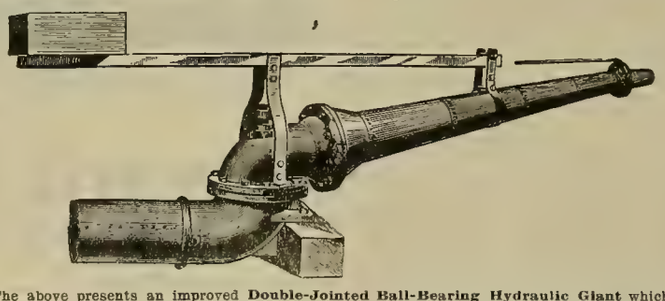


Gold Medal, Columbian Exposition, 1893.
MINE OWNERS and others having Refractory and Low Grade Gold and Silver Ores and Tailings should have their material tested by
The MacArthur-Forrest Cyanide Process.
Samples assayed and fully reported upon. Particulars upon application.
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California and Nevada Agent, Bertram Hunt, 216 Sansome Street, San Francisco.
OFFICE: McPHEE BUILDING, DENVER, COLORADO.



Roller, Steel and Special CHAINS
—FOR—
ELEVATING AND CONVEYING MACHINERY
FOR HANDLING MATERIAL OF ALL KINDS.
COAL MINING MACHINERY.
WIRE CABLE CONVEYORS.
For long and short distance conveying.
Western Branch, Denver, Colo.
THE JEFFREY MFG. CO., Columbus, Ohio.
Send for Catalogue. 163 Washington St., NEW YORK.

Double-Jointed Ball-Bearing Hydraulic Giants.



The above presents an improved **Double-Jointed Ball-Bearing Hydraulic Giant** which we build. The improvement consists of the introduction of a **Ball Bearing** by which the pressure of the water is reduced to a minimum and the direction of the nozzle changed at will with ease.
Catalogues and prices of our specialties of HYDRAULIC MINING MACHINERY furnished upon application. **JOSHUA HENDY MACHINE WORKS, 38 to 44 Fremont St., San Francisco, Cal.**

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CYANIDE
Peroxide of Sodium
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And other Chemicals for Mining Purposes.

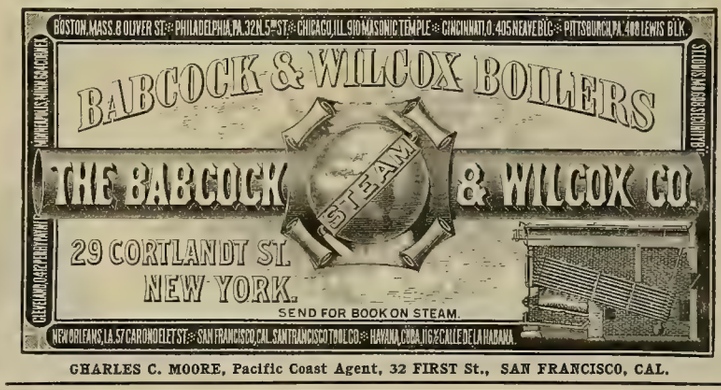


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Improved Facilities! Finest Work! Lowest Prices!
Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.
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The Denver Fire Clay Co.
Manufacturers of Assayers' and Chemists' Supplies.
Fire Brick and Tile for Metallurgical Purposes
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FOWLER'S
Fossil and Asbestos Sectional Covering.
As a Non-Conductor, Unequaled.
Special Rates for Steam Boilers and Drums
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A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc. Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S.F.

Hoskins' Patent Hydro-Carbon Blow-Pipe and Assay Furnaces.



No dust. No ashes. Cheap, effective, economical, portable and automatic.
SEND FOR PRICE LIST TO
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List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING APRIL 13TH, 1897.

580,568.—FUEL—Frank Batter, Marshfield, Or.
580,592.—REFINING ASPHALT—A. F. L. Bell, Carpenteria, Cal.
580,759.—STUMP PULLER—E. M. Bliss, Tacoma, Wash.
580,778.—LEVELING MACHINE—B. B. DeNure, Vekol, A. T.
580,819.—SMOOTHING MACHINE—F. E. Fay, Los Angeles, Cal.
580,574.—FAUCET AND VALVE—F. H. Fowler, S. F.
580,600.—WIND ENGINE—T. R. Goth, S. F.
580,692.—BEARING—J. Himes, Port Blakeley, Wash.
580,693.—BEARING—J. Himes, Port Blakeley, Wash.
580,788.—ANIMAL TRAP—J. Killefer, Los Angeles, Cal.
580,604.—FIRE REMOVER—R. M. Otey, San Jacinto, Cal.
580,557.—HEADLIGHT—R. P. Schwerin, S. F.
580,560.—FRUIT SLICER—I. Scoville, Oakland, Cal.
580,808.—WINDMILL—H. Soeliner, S. F.
580,563.—FRUIT CUTTER—M. B. Totten, Colusa, Cal.
580,823.—HOSE REEL—G. H. Williams, Los Angeles, Cal.
26,889.—DESIGN FOR CHECK HOOK—L. Heibner, Red Bluff, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FAUCET AND VALVE.—Frank A. Fowler, San Francisco, Cal. No. 580,574. Dated April 13, 1897. This invention relates to a discharge nozzle or faucet which may be applied to cans or receptacles of any kind containing liquid from which it is desired to withdraw the contents from time to time. It is especially applicable to cans containing oils. It consists of an interior spring-actuated controlling valve, an air vent connecting with the nozzle, a means for operating the valve and controlling the air vent simultaneously, so that the air vent is opened when the nozzle is opened and closed when the latter is closed. The device may be locked when the valves are closed, so as to prevent any leakage or escape therefrom.

FRUIT CUTTER.—M. B. Totten, Colusa, Cal., assignor of one-third to Joseph B. Cooke, same place. No. 580,563. Dated April 13, 1897. This invention relates to a hand implement or tool for cutting fruit so as to remove the pits therefrom preparatory to drying. It consists of opposing blades, each having a distinct cutting edge at its point and heel and an intervening cutting edge of curved or recessed form adapted to embrace and hold the pit while the severed sections of fruit are being removed, these blades being arranged to overlap at the point and heel on opposite sides so as to prevent their springing sideways while holding the pit.

PROCESS OF MANUFACTURING FUEL.—Frank Batter, Marshfield, Or. No. 580,568. Dated April 13, 1897. This invention relates to the manufacture of fuel from lignite and coal containing a low percentage of fixed carbon. It consists in subjecting the material to a low temperature in a closed retort to dry off the moisture and volatile products, then collecting and condensing the volatile products and allowing the gases therefrom to return to the retort furnaces to be used as a fuel after being first subjected to a washing action, then withdrawing the residue from the retorts, reducing it to fine particles or powder, withdrawing the tar and oil resulting from condensation of the volatile products and mixing them with the reduced residue from the retort, then subjecting the mass to pressure, baking it and separating it into blocks or ingots in molds, where it is subjected to pressure to form permanent blocks.

ELECTRIC HEADLIGHT.—R. P. Schwerin, San Francisco, Cal., assignor to Market Street Railway Co. No. 580,557. Dated April 13, 1897. This invention relates to the class of illuminating devices and is especially adapted as an electric light to be carried by electrically operated cars. A parabolic casing is constructed having a top opening, a lamp socket fixed therein; the parabolic mirror within the casing is separated from the lamp to form a ventilating space or channel, and an air inlet opens into the bottom of the casing just in front of the lower edge of the mirror, and an outlet between the outer portion and the ventilating space, thence to the open air. The front of the casing has a flat glazed door, through which the light is delivered. The casing is supported upon a jointed leg so that it may be set to any desired angle. The exit openings for the escape of air are protected by a shield.

APPARATUS FOR REFINING ASPHALTUM.—Arthur F. L. Bell, Carpenteria, Cal., assignor to the Alcatraz Asphalt Co., San Francisco, Cal. No. 580,592. Dated April 13, 1897. This invention relates to the general class of refining apparatus and is especially applicable to refining asphaltum. It consists essentially of a rotatable closed drum to receive a jar of material, means for admitting air or steam to the interior of the drum, and a means to permit the escape of the gases therefrom. The drum has a hollow axle, into one end of which the air and steam are admitted and allowed to pass into pipes or passages which discharge into the mass of material toward the bottom. The opposite end of the axle is designed to permit the escape of gases and vapors and hollow shields are so disposed with relation to the inlet and outlet openings as to protect the openings from the contents of the drum, the arrangement being such that the air or steam is continually injected into the lower part containing the asphaltum, and the inlet and discharge openings are protected.

FRUIT SLICING MACHINE.—Ives Scoville, Oakland, Cal. No. 580,560. Dated April 13, 1897. This invention relates to the class of slicing machines and is especially adapted for slicing such fruit as peaches after they have been peeled and the stones or pits removed. It consists essentially of a fruit holder having a recessed end to form a segmental socket, which receives the end of the fruit and having a horizontal forward projecting support upon which the fruit rests while being advanced to the slicing devices. These slicing devices consist of a series of radially disposed knives, towards which the slidable horizontal support or plate and the holder are movable. The holder is slotted so that the slots coincide with the blades, and when the holder is pushed forward the fruit will be subdivided by these blades, which pass into the slots of the holder sufficiently for that purpose.

A Great Mining Triumph.

Capt. J. R. DeLamar, of New York City, is one of the largest owners and workers of Gold Mines in the world. After the most careful investigation he purchased in August, 1895, two Griffin Mills, and his report is so remarkable as to demand the careful attention of every one interested in Gold Mining.

We give it in his own words.

NEW YORK, Jan. 9, 1896.

BRADLEY PULVERIZER CO. *Gentlemen:*—The two Griffin Mills have been in operation now for 90 days on the hardest rock, with the exception of corundum, that I have ever met during my mining life. They have taken the rock direct from the breaker, and they average about 20 tons to each machine, 40 mesh fine, without elevating or bolting. We simply put a ¼ mesh screen around the Griffin Mill, and the stuff comes out 40 mesh fine or over, which makes it an excellent pulp for leaching by cyanide or chlorination; therefore we have concluded to order **10 more Griffin Mills.** We have tried high-speed rolls and dry stamps, and after looking into the Huntington Dry Pulverizer, the Narod Pulverizer, the Stedman Pulverizer, the Frisbie Lucop, the Cook, and various other dry pulverizers, unhesitatingly recommend your Griffin Mill to any one.

Yours truly, (Signed) J. R. DELAMAR.

HOW 10 GRIFFIN MILLS WORK.

DELAMAR'S NEVADA GOLD MINING CO.,
SALT LAKE CITY, UTAH, Nov. 24, 1896.

BRADLEY PULVERIZER CO. *Gentlemen:*—In answer to your inquiry as to what the "Griffin Mill" is doing at our DeLamar Mill, DeLamar, Nevada, we beg to state that we often run 310 tons per day with 10 of your mills in operation, and on one occasion these 10 mills produced 408 tons in one day. I have no hesitancy in stating that they will regularly produce at least 30 tons per day each on our ore, which is extremely and unusually hard.

Yours very truly, H. A. COHEN, *General Manager.*

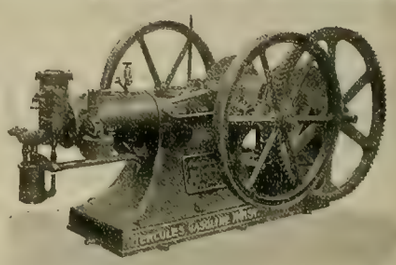
These strong letters coming from such representative men are conclusive evidence that we are right in claiming that the "Griffin Mill" will produce a larger amount of finer pulp at less cost than any other stamp or pulverizer made.

Let us send you a free copy of our illustrated pamphlet, which will tell you all about the Mill and bring to you other evidence of its great achievements.

BRADLEY PULVERIZER CO., 92 State St., Boston, Mass.

HERCULES GAS, GASOLINE AND DISTILLATE ENGINES.

HOISTING ENGINES, 2 h. p. to 200 h. p. ✦ **STATIONARY ENGINES,** 1 h. p. to 200 h. p. ✦ **MARINE ENGINES,** 2 h. p. to 200 h. p.



Our newly designed and perfected DISTILLATE VAPORIZER insures a saving of 50% on cost of running. Just ½ your expense SAVED BY USING A HERCULES in place of ANY other. We make no exception.

NEARLY 3000 HERCULES HOISTING, STATIONARY AND MARINE ENGINES IN ACTUAL USE. HIGH GRADE.

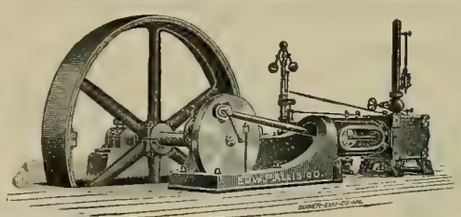
We claim **full power, automatic and positive adjustment regulating speed and consumption of fuel** in proportion to work being performed. **No spring electrodes to burn out. All springs are outside. Point of ignition, speed and amount of fuel can be changed while engine is in operation.**

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GEARS. P. T. TAYLOR & CO.
523 Mission St., San Francisco, Cal.



"1890" ENGINE.

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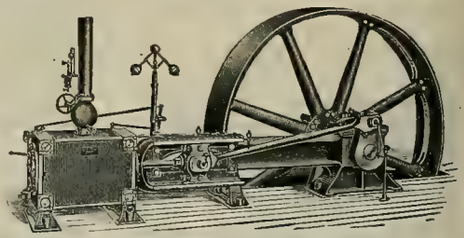
—✦ THE ✦—

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Reynolds Corliss Engines
FOR ALL PURPOSES.

MINING, MILLING AND SMELTING MACHINERY.

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Position as Prospector or Mining Engineer for New Mining Company.

First-class assayer, millman, miner and cyanider. Eighteen years' experience in coast mines. Bonds furnished if desired. Address L, Mining and Scientific Press Office.

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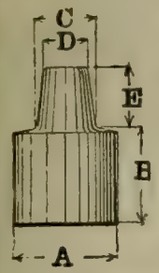
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The Russell Process.
For information concerning this process for the reduction of ores containing precious metals, and terms of license, apply to
THE RUSSELL PROCESS CO.,
Park City, Utah.

RISDON IRON WORKS,

Office and Works: Cor. Beale and Howard Streets, San Francisco, Cal.

MINERS, ATTENTION!



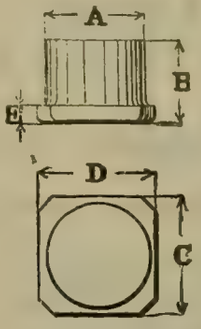
A=.....inches.
B=..... "
C=..... "
D=..... "
E=..... "

We beg to call attention to our "RISDON HAMMERED" Shoes and Dies, which are made of a special quality of steel, are hammered and then compressed in moulds so as to give the greatest possible density.

These Shoes will outlast any other make and will not chip or cup.

We have attached a sketch showing sizes; fill in the size of your Shoes and Dies, and order a trial set.

Our prices are as low as any, and the article we offer should commend it to all mine owners and mill men.



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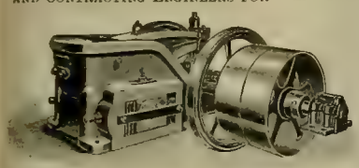
THE COLORADO IRON WORKS COMPANY, Denver, Colo.

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WE ARE MANUFACTURERS OF AND CONTRACTING ENGINEERS FOR **Gold, Silver, Lead, Copper and Pyritic SMELTING FURNACES.**

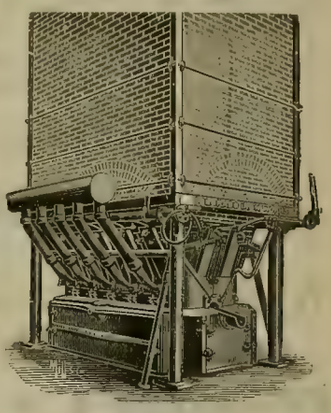
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We Guarantee Capacity Per Day to Any Degree of Fineness.



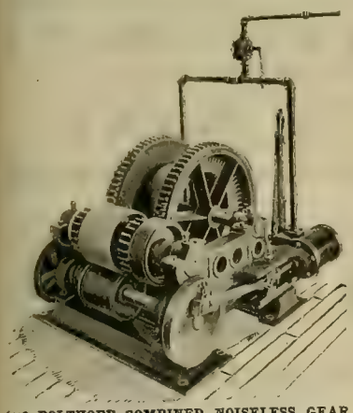
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OUR PATENT HOT BLAST APPARATUS for all Smelting Furnaces is a Success. A great economizer of fuel, and enlarges capacity of furnace.



Standard Silver-Lead Water Jacket Smelting Furnace.

Equipped with Arch-Bar System of Mantles, insuring rigid and strong walls. No Cracks.



6x8 BOLTHOFF COMBINED NOISELESS GEAR AND FRICTION HOIST.—Pat. Oct. 6, 1896.

"Things are in shape to push."
—*Gen. Sheridan to Gen. Grant.*

"Push things."
—*Gen. Grant to Gen. Sheridan.*

WE HAVE IN SHAPE TO PUSH OUR NEW

Bolthoff Combined Noiseless Gear and Friction Hoist.

It is pre-eminently the

STRONGEST, MOST DURABLE, COMPACT and ECONOMICAL

Small Hoisting Engine Ever Built.

"IT'S A GOOD THING. PUSH IT ALONG!"

WRITE FOR DESCRIPTION AND PRICES. MENTION THIS PAPER.

HENDRIE & BOLTHOFF M'F'G CO.,
Denver, Colorado, U. S. A.



To Gold Miners!

Silver Plated Copper Amalgamating Plates

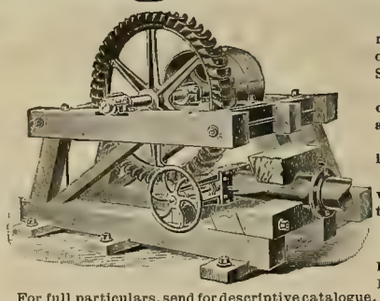
For Saving Gold in Quartz and Placer Mining.

Every Description of Mining Plates Made.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES REPLATED. TWENTY-SIX MEDALS AWARDED. GOLD, SILVER, NICKEL, COPPER & BRASS PLATING.

Denniston San Francisco Plating Works,
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E. G. DENNISTON, - - - - - - - - - - Proprietor.
Telephone, Main 5931. Send for Circular.

Knight's Water Wheel.



The accompanying cut shows the general arrangement of Knight's Standard Water Wheel, of which there are hundreds in use in different States of the Union.

These Wheels are made from 2 feet to 6 feet in diameter, from 10 to 1000-horse power, and adapted to all heads and purposes.

Wheels inclosed in iron cases, from 6 to 24 inches.

Wheels for electrical power can be furnished with or without Governors. Highest regulation guaranteed.

Address all communications to KNIGHT & CO., Sutter Creek, Cal., or, RISDON IRON WORKS, Agents, San Francisco, Cal.

For full particulars, send for descriptive catalogue.

FRANCIS SMITH & CO.,

—MANUFACTURERS OF—

SHEET IRON & STEEL PIPE

FOR TOWN WATER WORKS.

Hydraulic, Irrigation and Power Plants, Well Pipe, Etc., all sizes.

130 BEALE STREET, SAN FRANCISCO, CAL.

Iron cut, punched and formed, for making pipe on ground where required. All kinds of Tools supplied for making Pipe. Estimates given when required. Are prepared or coating all sizes of Pipes with Asphaltum.

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Genuine English Pump Leather

For Heavy Mining Pump Buckets. Will outwear any other material and give best satisfaction. Samples furnished on application. A. C. NICHOLS & CO., Leather Manufacturers and Dealers, 404 Battery St., S. F.

MINE BELL SIGNALS.

Adopted, Used and in Force in Accordance with State Law.

FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act, passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 220 Market St., San Francisco.

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That Our Annual Production of

. . . Insulated Wire



EXCEEDS That of any other manufacturer in the United States and INCLUDES EVERYTHING in the Electrical Wire Line.

Washburn & Moen Manufacturing Co.

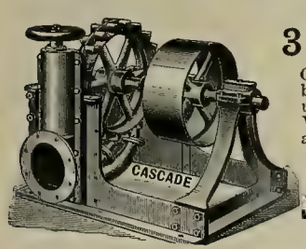
NOS. 8 AND 10 PINE STREET, SAN FRANCISCO, CAL.

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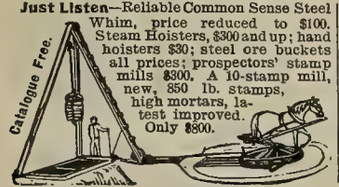
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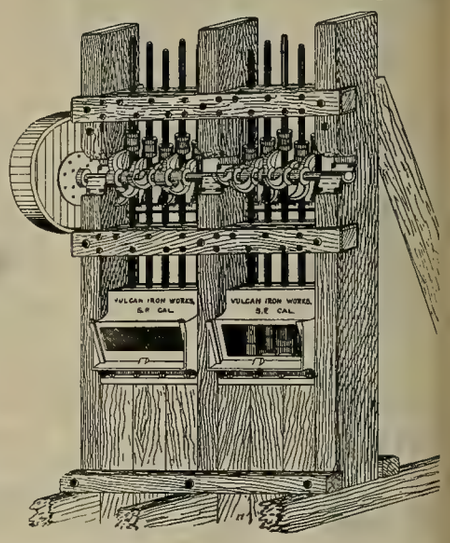
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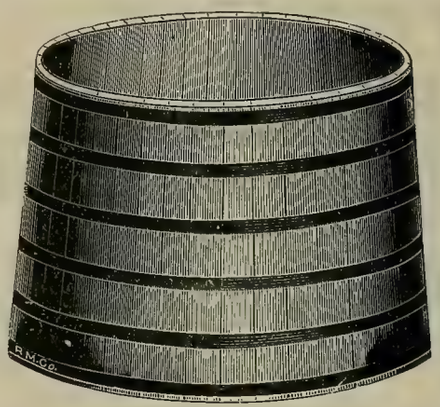
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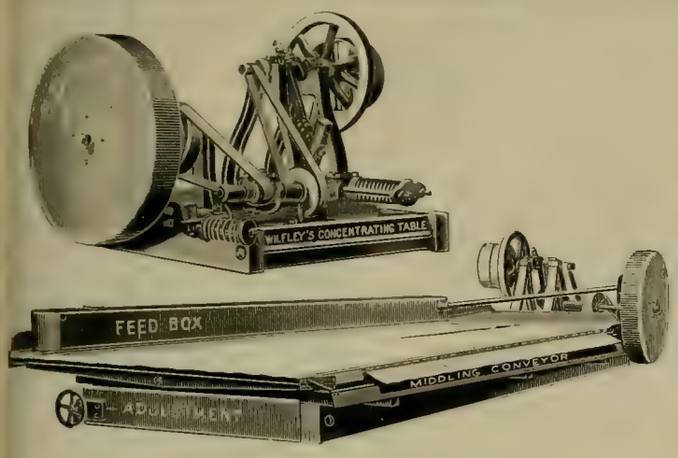
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ROMLEY, COLO., Jan. 19, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Answering yours of the 5th inst., would state that after a thorough trial we have discarded seven Woodbury Tables and two Johnsons and adopted the Wilfley Concentrating Table, which we think up to date is the best table in the market, so far as our knowledge is concerned. Yours very truly, [SIGNED] B. B. MORLEY, M'g'r Golf M. & M. Co.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

PRICE, $450.00.

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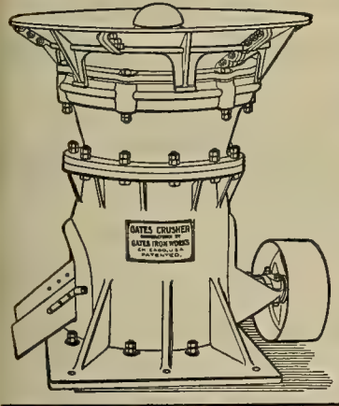


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General Mining Machinery

of improved designs. Nothing equal to

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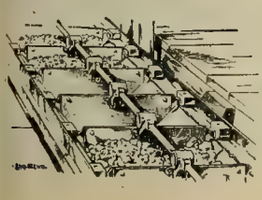
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Sacramento, California.

Market Reports.

The Markets.

SAN FRANCISCO, April 22, 1897.

There is a steady but, as yet, a slow increase in the volume of goods going out. From the agricultural sections the call, so far, has not come up to expectation, this, doubtless, is owing to dry weather and the need in many locality of rains at an early day to insure a good yield of grain. So far the fruit crop prospects are favorable for a large yield, yet it will be from one to three weeks before it can be known how much the fruit has set, if favorable then there will be more disposition to buy goods and make improvements in anticipation of a large outturn. Manufacturers report that the outlook favors the expectation that there will be a decided increase in demand for all kinds of work. The tariff question is somewhat of a disturbing factor at present, but this will soon be set at rest by the Senate committee's report on the House bill. It is generally conceded that nearly all, if not all the amendments that will be recommended will be accepted by the House.

In the local money market there is absolutely nothing new to report. The rates of discount are being shaded on gilt-edge security and call loans. For term loans the rates at commercial banks are unchanged, but the savings banks are disposed to more ease. The expectation that large requirements will come for crop moving purposes makes banks rather conservative in placing time loans. It is stated that some inquiry is being made as to accommodations later on or within the next two or three months. There are considerable quiet inquiries in the market for gold mining properties. It is stated that quite a number will change hands if expert reports are favorable. The New York market is reported as follows: "The money market appears to have fallen into a condition of extreme lethargy and nothing but the fact that many of the banks will not mark down their rates below 2% keeps the call money rate above 1%. The principal banks prefer to have call loans paid off than to reduce below 2%. Their argument is that if they loan below this rate it would eventually mean a 1% rate for call money and that within a very short time. They argue that they would have to keep twice as much money outstanding with money at 1% as they now keep in order to earn the same profit, with double the risk. In their opinion this is not good business. It is better to have loans paid off to a moderate extent. The Trust companies are taking a lot of business from the Clearing House banks, especially street loans. These companies are apparently willing to make the best of existing rates in the call loan market."

London advices continue to report an active demand for gold with the premium not only sustained, but tending to stronger figures.

New York Silver Prices.

NEW YORK, April 22. — Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	28 7-16	62
Saturday	28 7-16	62
Monday	28 7-16	62
Tuesday	28 7-16	62
Wednesday	28 7-16	62
Thursday	28 7-16	61 15-16

	Copper.	Lead.	Iron.	Tin.
Fri.	11 40 @11 60	3 25	10 00@12 50	13 30
Sat.	11 35 @11 60	3 25	10 00@12 50	13 25
Mon.	11 30 @11 50	3 27½	10 00@12 50	13 20
Tue.	11 30 @11 50	3 30	10 00@12 50	13 20
Wed.	11 25 @11 50	3 30	10 00@12 50	13 20
Thur.	11 25 @11 50	3 30	10 00@12 50	13 20

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	17½c Prem
New York Telegraphic Transfer	20c Prem
London Bankers' 60 days	$4.87½
London Merchants	$4.85½
London Sight Bankers	$4.89½
Refined Silver, per oz., 1000 fine	61¾
Mexican Dollars	49@50

SILVER.—The market held steady at 62 cents up to to-day, when it was a shade lower. The demand is slow not only here, but at the East. The last steamer for the Orient took out only $144,148 in bullion. The East reports a slow market. Our London advices are to the effect that steady holding in the United States keeps the market from breaking, owing to the very light demand from all sources.

MEXICAN DOLLARS.—The last steamer for China took out 14,998 dollars. The market is slow, with a very light inquiry reported. The East reports a quiet market, with shaded prices necessary to place a round parcel.

QUICKSILVER.—The market here is reported practically unchanged so far as quotations are concerned, but the demand is enlarging. The Eastern markets, at last mail advices, were easier. The last steamer for Central America took out 120 flasks.

Our market is quoted at $40 for domestic consumption.

COPPER.—The market has been sinking at the East and abroad for fully one month until prices are now, it would seem, low enough to justify buying. In our market quotations are not given lower, yet buyers can get concessions. James Lewis & Sons write under date of April 2nd from Liverpool as follows: "The quantity of Chile bars at Liverpool and Swansea is now reduced to 19,282 tons, against 30,008 tons a year ago, while the invisible supply of copper both in England and on the continent must be much less than it was on the 1st of January of this year. European consumption continues on a large scale, and a great increase is expected in the course of the year in the United States, so large that a leading American authority anticipates that the exports to Europe this year will not exceed 80,000 tons, against 125,000 tons in 1896."

The local market is quoted as follows:

Ingot, jobbing	—@14¼
Ingot, wholesale	—@13½
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17

LEAD.—There is a continued free consumption. Prices at the East and with us have not varied much the past week.

Our market is quoted in jobbing lots as follows:

Pig	4 00	@	4 25
Bar	—	@	4 50
Sheet	5 62½	@	6 12½
Pipe	4 87½	@	5 37½

SHOT.—The market is steady with only a fair jobbing demand reported.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

TIN.—The market with us is dull for both pig and plate, owing to the bulk of wants having been met. There is reported a quiet market, with lower prices ruling for pig. Plates are steady at combination prices.

We quote as follows in a jobbing way:

Pig, per lb	14½c@ —
Plate, I C coke, heavy, per box	$4 05@ 4 15
" " " light, "	3 95@ —

POWDER.—The market is steady.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

BORAX.—The market is reported fairly active.

The market is quoted as follows:

Refined, in car lots, in barrels	5
Refined, in carload lots in sacks	4¾
Powdered, in car lots	5
Concentrated, "	4¼

LEAD.—There is a fairly free consumption. The East reports quieter markets, with St. Louis not so strong, owing to a falling off in the demand.

IRON.—There is practically nothing new to report. The market is firmer for foreign and steadier for American. The East reports that Southern furnacemen think that no further reduction can be made in prices.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—The demand is light for all descriptions, but the market is held steady. The consumption of steam is expected to show a large increase this year.

We quote as follows:

SPOT FROM YARD—PER TON.

Wellington	$8 00@— —
Greta	6 00@ 6 50
Nanaimo	6 50@ 7 00
Gilman	5 50@ 6 00
Seattle	5 50@ 6 00
Coos Bay	— —@ 4 75
Cannel	8 00@— —
Egg, hard	12 00@13 00
Wallsend	6 50@— —

TO ARRIVE—CARGO LOTS.

Australian	5 50
Liverpool Steam	6 25
Scotch Splint	— —
Cardiff	6 25
Lehigh Lump	9 00
Cumberland	13 00
Egg, hard	10 00
West Hartley	6 50

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

ANTIMONY.—The market is steady.

Our market is quoted at 7⅞@8⅛c in a jobbing way. New York mail advices quote 7¼c for Cookson's, 7@7¾c for Hallett's and 7c for Japanese.

NAILS.—The market is firm.

Wire, carloads, basis per keg		
" jobbing, " "		$2 25
Cut, carloads, " "		
" jobbing, " "		2 10

Chemicals.

The market is quite firm for all lines affected by tariff legislation, but importers and jobbers are not disposed to advance values until the Senate bill is reported. This bill, it is thought, will be passed with only a few changes. The East reports strong markets, but with few changes in quotations, and these are of no consequence.

SPELTER.—The market is quiet.

We quote our market in a jobbing way at 5 cents a pound.

NICKEL ANODES.—The markets here and at the East are firmer.

PLATINUM. —Dealers report a light inquiry.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC.—The market is steady at quotations.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is firm.

We quote in jobbing lots at 50 cents per pound for ingots.

BISMUTH.—There is nothing new to report.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is steady.

We quote in a jobbing way at 70 to 75 cents per pound.

BONEASH.—The market is firm.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is fairly active, but steady at 2¼c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is quiet but firm at $1.70 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a fair demand at 2½c a pound from stores.

NITRATE OF SODA.—Advices from the East are unchanged.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is firm at 6 to 12c per pound from store for carboys, according to make.

NITRIC ACID.—Our market is reported steady from store at 6½c per pound in carboys.

SULPHURIC ACID.—The demand is slower. We quote in a jobbing way at 1½c per lb for 66%.

BLUE VITRIOL.—Our market is steady. We quote in a jobbing way at 4½c per pound.

Mining Share Market.

SAN FRANCISCO, April 22, 1897.

The market has continued fairly active at generally firmer prices. The action of the market gives unmistakable evidence of its being manipulated for a coming deal. The moves also indicate that stronger parties are in the background who are pumping outside shareholders of their long-held assessment paid shares, and at figures considerably below what have been paid in assessments. There can be no doubt that the mines, taken as a whole, were never in better condition for working to the west, or in any other direction, while the general condition—financial, manufacture, or general business—of the country is shaping itself in line with greater activity and more prosperous times which will give strong support to a speculative bull campaign this summer and fall, not only in the East, but also on this coast. It looks now as if the many ways by which the mines have been looted in the past, have been well ventilated through the press and law suits so as to make it impossible to bring a new action at law against those guilty, owing to its being outlawed by time after the facts had been made known. This, of course, does not apply to the cases now pending in court, but these will probably be out of the way within a few months. The advance in Con. Virginia the past week to $2.10 a share, with other north end shares sympathizing, is said to have been based on news of an improvement on the 1650-foot level towards the Ophir line. Official advices do not give much importance to the improvement, but private advices do. It is stated that the vein is 4 feet wide, 2 feet of which goes considerably over $100 to the ton. It looks as if more ore is expected in that portion of the mine, for they have prepared for something of the kind with a two-compartment shaft. The west joint workings of Kentuck, Crown Point and Yellow Jacket on an upper level is expected to result in finding high grade gold ore, provided the west crosscrift is not stopped before reaching the ore known to be towards the west. The long crossdrift run jointly by Con. Imperial, Challenge and Confidence ought to be near the west lode. When this is struck better prices ought to rule for the shares. There are several points along the lode which bear close watching, provided the work is done honestly and in the interest of shareholders, and not operators in the share market in this city.

Official letters from the Comstock mines do not report any essential changes, yet they indicate the approach in two or more points, which ought to give good results before many weeks pass, unless the inside give word to have it stopped. In Con. Virginia they are getting the 1000-foot level in better working condition and until this is done it looks as if it is not the intention to show up the ore there. The work on the 1550-foot level is practically unchanged. On the 1650-foot level, as noted above, an improvement is reported. There is an increase in the number of tons raised. Last week there were 94 tons assaying over $42 to the ton. There was milled 135 tons which yielded in bullion an assay value of $15,124. In Ophir some stringers of good ore have been struck in prosecuting the work reported in our last issue. In Mexican fair progress is still the order in running the west crossdrift on the 1000-foot level. The total length was 56 feet about one week ago. From Sierra Nevada, Union and Utah nothing new from official sources has come to hand. The work is the same heretofore reported, while the number of feet run does not vary much. Some very interesting work is being done in Andes. Best & Belcher and Gould & Curry continue to report work in the joint east crossdrift on the 800-foot Bonner shaft

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.	Secretary.
Alpha Con M & M Co, Nev.	18	5c	Mar 2.	Apr 5. Apr 27.	C E Elliott, 309 Montgomery
Belcher S M Co, Nev.	54	25c	Mar 2.	Apr 6. Apr 27.	C L Perkins, Mills Bldg
Brunswick Con G M Co, Cal.	11	3c	Mar 22.	Apr 23. May 15.	J Stadfeld
Channel Bend M Co, Cal.	7	2c	Mar 22.	Apr 24. May 17.	J P Langhorne, 39 Sutter
Con Cal & Va M Co, Nev.	8	25c	Mar 8.	Apr 13. May 3.	A W Havens, 309 Montgomery
Confidence S M Co, Nev.	28	30c	Mar 12.	Apr 16. May 7.	A S Groth, 414 California
Crown Point G & S M Co, Nev.	70	20c	Mar 24.	Apr 28. May 19.	James Newlands, Mills Building
East Best & Belcher, Nev.	5	15c	Mar 25.	Apr 26. May 13.	E W Sichel, 337 Pine
Eureka Con D M Co, Cal.	8	5c	Apr 2.	May 15. June 5	D M Kent, 330 Pine
Golden State M Co, Idaho.	1	1½c	Mar 29.	May 1. May 17	E Logan, 101 Van Ness
Gray Eagle M Co, Cal.	46	5c	Mar 30.	May 8. May 29.	W J Gurnett, 308 Pine
Hale & Norcross S M Co, Nev.	111	10c	Mar 20.	Apr 23. May 14.	R R Grayson, 331 Pine
Horseshoe Bar Con M Co, Cal.	7	10c	Mar 8.	Apr 17. May 8	D M Kent, 330 Pine
Jamison M Co.	9	5c	Nov 27.	Apr 24. June 19.	Sam W Cheyney, 120 Sutter
Marguerite G M & M Co, Cal.	6	10c	Apr 12.	May 24. June 21.	F Mettmann, 237 Twelfth
Mexican G & S M Co, Nev.	56	20c	Mar 3.	Apr 7. Apr 29.	C E Elliott, 309 Montgomery
Overman S M Co, Nev.	77	10c	Apr 12.	May 17. June 7.	Geo D Edwards, 414 California
Potosi M Co, Nev.	47	20c	Mar 10.	Apr 14. May 5.	C E Elliott, 309 Montgomery
Savage M Co, Nev.	92	20c	Apr 13.	May 17 June 7.	E B Holmes, 309 Montgomery
Seg Belcher & Mides Con M Co, Nev.	19	5c	Apr 6.	May 10. May 29.	E B Holmes, 309 Montgomery
Sierra Nevada S M Co, Nev.	112	25c	Mar 2.	Apr 6. Apr 26.	E L Parker, 309 Montgomery
Sulphur Bank Q M Co, Cal.	5	25c	Mar 23.	May 3. June 3.	T Wintringham, 306 California
Tenabo M & M Co., Nev.	1	50c	Mar 29.	May 4. May 24.	T J Read, 606 Sutter
Thorpe M Co, Cal.	6	2½c	Apr 14.	May 22. June 13.	A F Frey, Phelan Building
Union Con M Co, Cal.	1	10c	Mar 18.	Apr 22. May 10.	J M Fletcher, 320 Sansome
Union Con S M Co, Nev.	54	20c	Apr 7.	May 11. June 1.	A P Swain, 309 Montgomery

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level. In Savage active exploiting and dead work is being done in several levels. No work is reported in Chollar. They are still opening to the south on the tunnel level in Potosi. Some ore, about 40 tons, was extracted last week. It assayed over $42 to the ton. In Bullion work is continued on the north lateral drift. The work in Alpha is still confined to the 500-foot level. Last week they averaged 1-foot a day. There is no change in the work being done in any of the Gold Hill mines, and nothing of much importance is expected to be reported until the inside managers have frozen outside holders out of the bulk of their holdings which were bought at higher figures. No mention has been made yet of the ore strike made a long time ago in two of the mines. The official letters do not contain anything that would indicate an expectation of rediscovering the ore at an early date. In Alta the work is practically the same as heretofore reported by us. There are some ugly rumors out about the management of this mine.

From the Brunswick lode public advices do not report any material change from advices received the preceding week, but private advices are quite encouraging; yet in operating in shares it is not safe to go by the latter even if they are thoroughly correct. The joint work being done by Con. Virginia, Best & Belcher and Gould & Curry is confined to sinking shaft No. 2, which is down on an incline about 730 feet, and running east crosscrifts on the 300-foot level. In Savage no change is reported in the work that is being done. In Chollar they have about finished the station in shaft No. 1 on the 600-foot level. They have started three crossdrifts on the 500-foot level—two to the east and one to the west. On the 400-foot, 300-foot and 200-foot levels active exploiting work is the order. Last week nearly 200 tons of ore were extracted from these levels and sent to mill. The battery assays averaged over $17 in gold and 16 ounces in silver to the ton. This was higher than the car sample assays.

The following illustrates the changes of the week:

MINES.	Apr. 15.	Apr. 22.
Alpha	$ 08	....
Alta Consolidated	....	....
Andes	20	....
Belcher	36	....
Best & Belcher	64	$ 66
Bodie	....	....
Bullion	....	....
Challenge	33	....
Chollar	1 15	1 05
Confidence	....	....
Consolidated California and Virginia	....	1 80
Consolidated New York	....	....
Crown Point	....	12
Exchequer	....	....
Gould & Curry	33	32
Hale & Norcross	88	....
Justice	....	....
Mexican	46	48
Ophir	1 00	1 05
Overman	....	....
Potosi	63	55
Savage	20	....
Sierra Nevada	47	50
Union	....	26
Utah	....	....
Yellow Jacket	....	27

San Francisco Stock Board Sales.

SAN FRANCISCO, April 22, 1897.

9:30 A. M. SESSION.

100 Crown Point	12	100 Mexican	48
150 Con Cal & Va	1 80	200 Union	26
100 Gould & Curry	32	100 Yellow Jacket	27

SECOND SESSION—2:30 P. M.

400 Best & Belcher	66	200 Gould & Curry	32
300	65	400 Mexican	47
600 Chollar	1 05	200 Ophir	1 05
100	1 00	1100 Potosi	55
300 Con Cal & Va	1 75	400 Sierra Nevada	50
250	1 65	700 Yellow Jacket	26
500	1 70		

Rainfall and Temperature.

The following data for the week ending 5 A. M., April 21, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week.	Total Seasonal Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date.	Average Seasonal Rainfall to Date.	Maximum Temperature for the Week.	Minimum Temperature for the Week.
Eureka	1.02	49.06	42.69	40.55	60	40
Red Bluff	.34	24.08	17.65	23.80	92	44
Sacramento	.11	16.98	19.09	19.07	87	42
San Francisco	.04	22.61	17.60	22.34	70	45
Fresno	T	10.53	5.99	6.63	94	42
San Luis Obispo	T	20.71	16.06	.....	80	42
Los Angeles	T	16.74	8.88	19.07	80	50
San Diego	....	11.63	5.86	9.99	66	50
Yuma	....	5.35	.88	2.93	100	56

Stockholders' Meeting Jamison Mining Co.

Notice of Annual Meeting of Stockholders of the Jamison Mining Company: In accordance with the by-laws of the company, the regular annual meeting of stockholders of the company will be held at 2 o'clock P. M. on MONDAY, the 3d of May, 1897, at the office of the company, rooms 50 and 54, 120 Sutter street, San Francisco, California.

By order of the President.

SAM W. CHEYNEY, Secretary.

Dated San Francisco, April 9, 1897.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Charles and Ben Howlett, in the Howlett claim, near Columbia Hill, Nevada Co., to deposit tailings in Knapp Ravine, and from the Marguerite Gravel and Quartz Mining Co., in the Marguerite Mine in Eureka Mining District, Nevada Co., to deposit tailings in a ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on May 10th, 1897, at 1:30 P. M.

Assessment Notices.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 13th day of April, 1897, an assessment (No. 6) of 025 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, room 11 Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of May, 1897, will be delinquent and advertised for sale at public auction; and an essa payment is made before, will be sold on MONDAY, the 14th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. PREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

SEG. BELCHER AND MIDES CONSOLIDATED Mining Company.—Location of principal place of business, San Francisco, California; location of works, Gold Hill Mining District, County of Storey, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 6th day of April, 1897, an assessment (No. 19) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, No. 309 Montgomery street, Room 50, Nevada block, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1897, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 29th day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. B. HOLMES, Secretary.

Office—No. 309 Montgomery street, Room 50, Nevada block, San Francisco, California.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 12th day of April, 1897, an assessment (No. 6) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of May, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 21st day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California. Office hours from 5 to 6 o'clock P. M. The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9), of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which said assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 26th day of March, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on SATURDAY, the 24th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 19th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

STOCKHOLDERS' MEETING.—Notice of Stockholders' Meeting of the Steeple Rock Development Company: In accordance with a resolution passed by the Board of Directors of the Steeple Rock Development Company, a meeting of the stockholders of this company will be held at 3 o'clock in the afternoon on TUESDAY, the 11th day of May, 1897, at its principal office, No. 320 Sansome street, room 24, San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Million Dollars, in four hundred thousand shares, at the par value of five dollars each.

J. PICHOIR, Secretary.

Dated at San Francisco, Cal., March 26, 1897.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from M. J. Williams and others, in the Galena Hill Mine, near Camptonville, Yuba Co., to deposit tailings in Eastman's Ravine; from Joseph Hustler, in the Hustler Mine No. 2, near Cherokee, Nevada Co., to deposit tailings in Shady Creek; and and from McGregor & Nix, in their mine near Cherokee, Butte Co., to deposit tailings behind the impounding works of the Spring Valley Mine, gives notice that a meeting will be held at room 59, Flood Building, San Francisco, Cal., on May 3, 1897, at 1:30 P. M.

PROPOSALS FOR CANAL.

Sealed proposals will be received at the office of the Southern California Power Company, Redlands, California, until May 15, 1897, for the construction of 3½ miles of canal, on the north side of Santa Ana river, from the mouth of Bear creek to the mouth of Keller creek, San Bernardino county, California.

The work is mostly through granite rock and consists of tunnels, flumes and trestles. Over two miles of the distance is through tunnels ranging from 100 to 1600 feet in length. There are twenty tunnels in all.

Contractors may bid on the whole or any part of the work. Plans and specifications can be seen at the office of the company, or they will be sent by mail upon application if desired. Satisfactory references must be given by bidders as to their responsibility, and as a guarantee that a contract would be entered into, providing the bid is accepted. The company reserves the right to reject any and all bids.

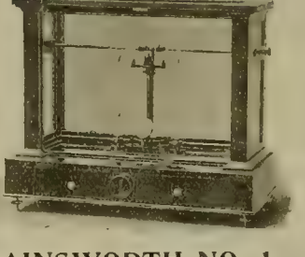
SOUTHERN CALIFORNIA POWER CO.
By HENRY FISHER, President.

NOTICE TO CONTRACTORS—Electric Lighting Plant. Office of the Water Commission, Astoria (Or.), April 8, 1897.—Notice is hereby given that sealed proposals will be received at this office until 12 o'clock, noon, May 1, 1897, for the various works and materials necessary for the installing of a series sixty-arc-light plant to be operated by an impulse water wheel, and owned by the municipality. Proposals must be made on printed forms supplied by the clerk of the Commission, and in full accordance therewith, and must be accompanied with a certified check or bank deposit in an amount equal to (10) per cent of the aggregate sum bid, made payable to the clerk of the Astoria Water Commission. Duplicates of bids and accompanying specified plans shall be filed at the office of the engineer on or before the date mentioned. Plans and specifications can be seen after April 15th, either at the office of this Commission or at the office of the engineer.

THE ASTORIA WATER COMMISSION.
By W. W. PARKER, Chairman.
Attest: H. G. VAN DUSEN, Clerk.
ARTHUR L. ADAMS, M. Am. Soc. C. E., Engineer, 401 California Street, San Francisco, Cal.

FOR SALE.—A Well-Developed Gold Mine in This State.

Twenty-two hundred feet of tunneling done. Lots of ore in sight, with a 10-stamp mill now working. Map of property can be seen any time. Prefer to negotiate with intending purchasers and so save large commissions. Address Box 19, care Mining and Scientific Press, 220 Market Street, San Francisco, California.



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Has prospects for sale in Trail Creek and the whole of the Columbia basin. Will buy legitimate stock and mines for investors. Will examine mines. Has lots for sale in Trail and Deer Park.

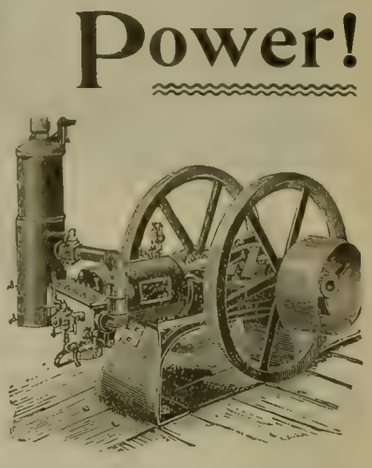
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This Engine can be operated on either Crude Oil, Distillate, Gasoline, or Kerosene. It is the cheapest power on earth and is not tied to any one kind of Oil, but can use any kind that will make gas and is not handicapped by being compelled to use a certain Oil. Do not forget this when in need of an Engine.

We guarantee our Engines to work perfectly on California Crude Oil, or Distillate, or any other kind of gaseous Oil; we however prefer CALIFORNIA CRUDE OIL, from Coalinga, Fresno county, for the reason that gas from Crude Oil will produce more power from the number of feet of gas used than from any other Oil, and it is also a natural lubricant as well, the valves being always lubricated sufficiently to prevent them from sticking, thus assuring greater durability of the working parts than it otherwise would be in using dry gas. And another advantage we claim is, that danger from explosions is reduced to a minimum, there being no accumulation of gas, but is used by the Engine as fast as it is generated and hence is absolutely safe. The following is a test that we made with one of our Five-Horse Power Crude Oil Engines, running ten hours on the different gas oils:

California Crude Oil	40 grav.,	7½	galls. at	5c., $.37½
Distillate	40 "	7½	"	8c., .60
Domestic Coal Oil	40 "	7½	"	12½c., .93¾
Gasoline	74 "	8¾	"	15c., 1.31¼
City Gas		1000	feet,	2.00

We manufacture all sizes from two-horse power up, and will guarantee that our Engines will run cheaper and are more simple in construction, have fewer parts and hence are more durable than any other Gas Engines on the market. Seeing is believing; don't take our word for it, but come and investigate for yourselves. You can always see one in operation at our works. We will be pleased to see you and will at all times take pleasure in showing them up. Our Engines are specially adapted for running well and mining machinery—in fact, for any kind of power desired. We are the pioneers and first inventors of Crude Oil and Distillate Engines. We always lead and never follow. Send for Catalogue and Price List of the only genuine Crude Oil and Distillate Engine made.

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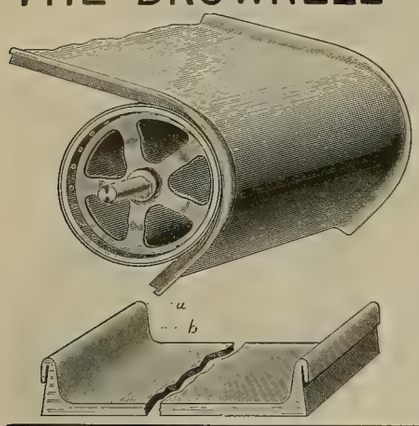
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It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

ORIGINAL EMPIRE MILL & MINING COMPANY,
GRASS VALLEY, NEVADA CO., CAL., Feb. 20, 1897.

JAS. S. BROWNELL, ESQ., San Francisco, Cal.—DEAR SIR: The Brownell Patent Lip flange belt for ore concentrators, which I bought of you nearly two years ago, has been in constant use and is in good order and gives us perfect satisfaction. We have several other kinds of belts in the mill, and your belt and flange I consider the best of all. Yours respectfully, ROBT. WALKER, Superintendent.

ROANOKE MINING COMPANY,
MOKELUMNE HILL, March 5, 1897.

MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: We have in our 20-stamp mill at this place five Frue vanners; three of these are equipped with the Patent Lip flange belt and two with the plain flange belt. We certainly consider the former a great improvement on the latter. They will certainly wear much longer, as cracking now seems out of the question. Any one purchasing the Frue vanning machine should see that it is equipped with the Patent Lip flange belt. Very truly yours, ROANOKE MINING COMPANY,
Per G. M. WILDE, Acting Superintendent.

For any information regarding Frue Vanner or Belts, call on or address

JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.
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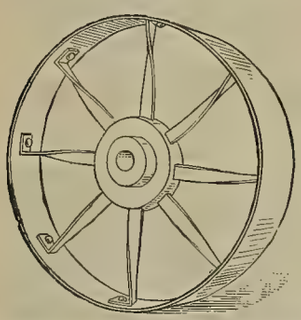
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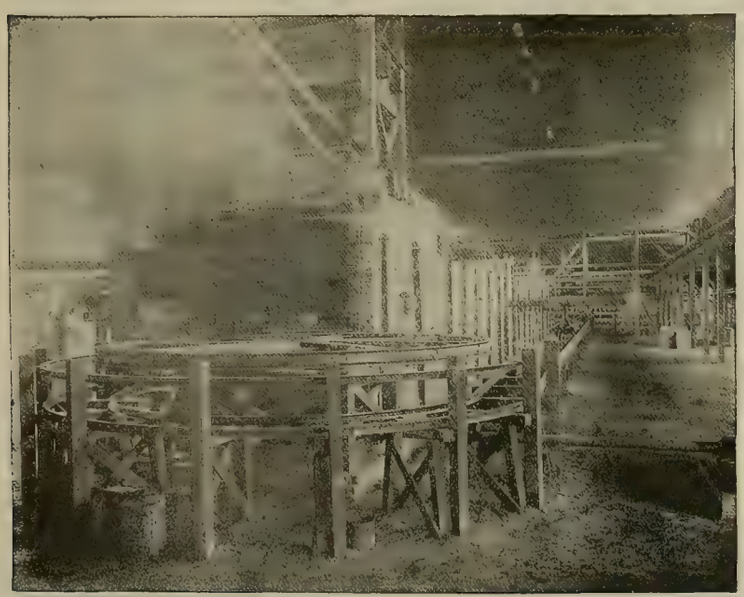
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ROPP STRAIGHT LINE FURNACE

FOR ROASTING, CHLORINATING AND DESULPHURIZING ORES.

Extracts from Letters Received from Mr. Philip Argall, Manager the Metallic Extraction Co., Cyanide, Colorado:

January 2, 1897.

"The roasting is invariably good. We can do 80 tons per day to 0.13% sulphur, when everything runs smooth. Our month record which, of course, includes all delays, is 1700 tons, from 1.94% sulphur to 0.18%."

February 19, 1897.

"Our furnace is now running very nicely indeed, averaging 90 tons per day to 0.10% sulphur, and doing excellent work; in fact it has improved right along and we are highly pleased with it.
"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

The ROPP FURNACE is now in successful operation at the following reduction works: The Hanauer Smelting Works, Salt Lake City, Utah (one furnace); The Metallic Extraction Co., Cyanide, Colo. (one furnace); The Colorado-Philadelphia Reduction Co., Colorado City, Colo. (three furnaces); The Selby Smelting & Lead Co., Selby, Cal; (one furnace); The Mount Morgan Gold Mining Co., Rockhampton, Queensland (one furnace); and Broken Hill Proprietary Co., Broken Hill, New South Wales (two furnaces).

Catalogue on Application.

MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 1921.—VOLUME LXXIV. Number 18. SAN FRANCISCO, SATURDAY, MAY 1, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Two California Mines.

On this page is illustrated two typical large well-managed California mines—the old Providence at Nevada City and the Uncle Sam near Kennett, Shasta county. One thing that strikes the miner from the arid regions or from the more rigorous climates of the north is the great advantage the climate is to the miner along the Sierras. As far as the weather is concerned, in nearly all cases he may work the year round without any difficulty. For this reason, some day, with the splendid water power of the mountains, California should become a great manufacturing State. The employer of labor knows how much better value can be obtained from workmen and from machinery in an equable climate than a more rigorous one.

The view of the surroundings at the Uncle Sam is a great contrast to those of mines in many districts of the West, but such scenes may be found in any mining camp from Siskiyou to the southern end of the Sierras.



PROVIDENCE MINE, MILL AND FURNACE.

The Providence mine is one of the old and deep mines of Nevada county. It has seen many ups and downs, like other of the rich properties of to-day. In 1887, after having been given over to tributers, the owners began to work it but soon quit. Again in 1890 work was resumed, the 1250-foot shaft retimbered and new machinery put in. Since then the mine has become one of the leading properties of the district, employs about 100 men and keeps its 40-stamp mill running steadily. Several efforts have lately been made by European capitalists to purchase the Providence.

The Uncle Sam is comparatively a new mine, having been located in 1886. It is situated in the Backbone mining district, [illegible] Kennett, in Shasta county, and owned by t[illegible]erra Buttes Gold Mining Company, L'd. Up t[illegible] a year ago this property paid large div[illegible]—nearly a million altogether—but the pay[illegible] were worked out about a year ago and only [illegible]x's fo[illegible] tributers are working. This is an example [illegible] equipped and well-managed property up t[illegible]e of its closing down.



UNCLE SAM MINE AND MILL.

[illegible] River Dredging.

[illegible]t the [illegible]rable money has been exp[illegible] same upon dredgers for working [illegible]auriferous gravels of the Fras[illegible] and Quesnelle rivers, in British Columbia, but without very gratifying results. During the season of 1896 there were seven dredgers in operation, some only for a few days, but none of them achieved more than a partial success. Four others had been built and abandoned before last year. The total cost of these machines is estimated at $170,000, and none of those in operation last year will be worked this season without radical changes in the machinery. It seems that the natural obstructions to work—the swift currents and heavy boulders—will prevent any successful operations unless new methods are adopted. The work done, however, has demonstrated that the beds of the streams are rich in places. Several dredgers are being rebuilt for another trial.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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J. F. HALLORAN.....General Manager

TO THE PUBLIC.

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San Francisco, May 1, 1897.

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British Capital's New Field.

There will soon be a great change in the trend of investment of English capital in mining properties, unless all the signs fail. In last week's issue there was some account of the last year's work on the Rand in South Africa, from which it appears that the cost of mining has amounted to more than the total yield of gold. This would not be a bad sign in an undeveloped district; but in Africa, where the amount of ore that will be available may be estimated with comparative certainty, it seems a great deal. Certainly the British public will not invest in Africa with any expectations of great profits or opportunities for speculation.

In Western Australia the case is a little different. While the profits from the [illegible] invested have been extremely small, there can [illegible] question that the country is practically under[illegible] and there will be opportunities for speculati[illegible]t present, owing to overcapitalization, the E[illegible]vestor is not inclined to make investments. So much harm has been done by this overcapi[illegible]n, that it is difficult now in London to f[illegible]d mines from any part of Australia.

The British speculators a[illegible]omoters are bound to find new fields, and, as a[illegible]t, their representatives are to be seen in far [illegible]eater numbers than ever before in the western p[illegible]t of the North American continent. This will bring in a great deal of capital to the Western States, Mexico and British Columbia and the development of many large properties that are now undeveloped. But one trouble will come from it all: The English promoter will indulge in his old habit of overcapitalization and many a district in the West will receive a black eye in the London market.

British Columbia is already suffering from this to a certain extent, and the good people there lately formed a miners' protective association in the west Kootenay country, whose purpose is to protect the investing public and give out such information as will be of value to prospective purchasers. It is stated that numerous companies have been organized and the stock sold largely on account of the proximity of the prospect to some well known property. To such an extent has this been carried on that many Eastern people are beginning to lose confidence in the mines of Trail Creek and other parts of British Columbia. Such an organization can be the means of doing an immense amount of good by exposing any wild cat scheme which may appear in public.

California Bullion Product.

The statistics of bullion product of California for the calendar year 1896 have been forwarded from the San Francisco Mint to the Director of the United States Mint at Washington for publication in his annual report on the "Production of Gold and Silver in the United States." The following statement shows the gold and silver yield of the State by counties for 1896:

COUNTY.	Gold.	Silver.	Total.
Alpine	$ 400		$ 400
Amador	1,523,351	$ 3,767	1,527,119
Butte	749,316	5,389	754,705
Calaveras	1,546,398	500	1,546,898
Del Norte	24,150		24,150
El Dorado	812,289	533	812,823
Fresno	28,235	99	28,334
Humboldt	65,092		65,092
Inyo	238,507	108,619	347,126
Kern	590,866	34,649	625,516
Lassen	40,300		40,300
Los Angeles	35,468		35,468
Madera	104,339	1,240	105,579
Mariposa	335,637	180	335,817
Merced	1,250		1,250
Mono	451,553	82,283	533,837
Nevada	2,380,756	8,584	2,389,340
Placer	1,674,844	6,690	1,681,534
Plumas	462,526	83	462,609
Riverside	262,800	13,450	276,250
Sacramento	133,050		133,050
San Bernardino	96,722	130,714	227,436
San Diego	568,578	40	560,618
Santa Barbara	8,592		8,592
San Luis Obispo	3,000		3,000
Shasta	599,209	24,233	623,443
Sierra	786,174	423	786,598
Siskiyou	1,091,264	652	1,091,917
Stanislaus	16,635		16,635
Tulare	20,092		20,092
Tuolumne	1,070,141	328	1,070,470
Trinity	1,296,330		1,296,330
Yuba	171,687		171,687
Totals	$17,181,562	$422,463	$17,604,026

In 1895 the yield of gold of the State was $15,334,317, and that of silver was $599,789, a total of $15,934,107. A comparison of these figures shows that the gold yield of 1896 increased over that of 1895 by $1,847,245. In 1894 the gold yield of the State was $13,923,281; in 1893, $12,122,844; in 1892, $12,571,900. For purposes of comparison is appended the gold and silver product of California for 1895:

COUNTY.	Gold.	Silver.	Total.
Amador	$ 1,391,929	$ 1,089	$ 1,393,018
Butte	697,260	8,935	706,196
Calaveras	1,717,916	77	1,719,993
Del Norte	8,250		8,250
El Dorado	700,101	447	700,548
Fresno	47,249		47,249
Humboldt	92,635		92,635
Inyo	92,142	188,329	280,471
Kern	231,433	46,064	277,497
Lassen	25,000		25,000
Los Angeles	23,350		23,330
Madera	163,323		162,323
Mariposa	216,622	7	216,629
Merced	1,500		1,500
Mono	552,690	84,910	637,600
Nevada	1,789,815	400	1,790,215
Orange	144		144
Placer	1,599,634	5,272	1,604,907
Plumas	602,951	271	603,222
Riverside	285,106	2,550	287,656
Sacramento	145,872		145,872
San Bernardino	131,360	219,410	350,770
San Diego	344,307	600	344,907
San Luis Obispo	3,000		3,000
Santa Barbara	4,000		4,000
Shasta	781,696	28,417	810,113
Sierra	694,469	106	694,576
Siskiyou	950,006	177	950,183
Stanislaus	26,481		26,481
Trinity	1,166,745	1,257	1,168,002
Tulare	16,320		16,320
Tuolumne	666,754	312	667,066
Yuba	111,482		111,482
Unapportioned	53,786	11,153	64,940
Totals	$15,334,317	$599,789	$15,934,107

The following shows the increase or decrease in the yield of California counties for '96 as compared with '95:

COUNTY.	Increase, 1896, over 1895.	Decrease, 1896, from 1895.
Alpine	$400	
Amador	131,421	
Butte	52,035	
Calaveras		$171,526
Del Norte	15,900	
El Dorado	112,196	
Fresno		19,014
Humboldt		27,542
Inyo	146,364	
Kern	359,433	
Lassen	15,300	
Los Angeles	12,138	
Madera		57,983
Mariposa	119,014	
Merced		250
Mono		101,136
Nevada	590,940	
Orange		144
Placer	75,209	
Plumas		140,424
Riverside		22,306
Sacramento		12,822
San Bernardino		34,637
San Diego	216,270	
Santa Barbara	4,592	
Shasta		182,486
Sierra	91,704	
Siskiyou	141,258	
Stanislaus		9,846
Tulare	3,772	
Tuolumne	403,387	
Trinity	129,585	
Yuba	60,205	

When it is considered that there have been no discoveries of new districts nor the introduction of more than the usual small amount of foreign capital, the figures given say much for the stability of the industry of mining in California. There has been less of the speculative element in connection with mining in this State probably than in any other mining district in the world of late years, and a larger proportion of the capital required for development has been supplied by local people. True, it is a complaint often heard that California capitalists are very slow about taking hold of mining, and many ask why a boom does not materialize. If such a record as has been made for the past eight years will be continued under present conditions it is to be hoped that the day of the "boom" and wild speculation is far off.

A healthy, steady growth of the mining industry in this State can do much for all other industries, while factitious work would most certainly be followed by a relapse that would bring general disaster. Such has been the case of late with South Africa and western Australia. The latter is one of the best illustrations of the evils of speculative mining. There can be no doubt that the mines are of value and will in time add much to the world's wealth. But they were taken up by promoters and speculators in England and overcapitalized. As a result, millions were expended foolishly and now it is almost impossible to float not only a western Australia mine in London, but even a mine from other colonies of Australia. It will be several years before the colonies will recover from the setback. It is hardly necessary to mention the evils that followed the wild speculation on the Comstock. It is well understood that for that the quartz mines of California were deserted and their development delayed many years. For a long time most of the men of means in San Francisco foreswore mining of all kinds, and it looked as if mining in this State would continue to decline. There has, however, been a healthy recovery that promises a future more brilliant than the great past of the leading modern El Dorado.

Worth Noticing.

The leading authority on advertising and circulation in the United States is the American Newspaper Directory, published by Geo. P. Rowell, 10 Spruce street, New York City. In the last issue of that volume, under the head of "Mining and Engineering," is said:

In all the States of the Far West and the Pacific slope, consisting of California, Oregon, Washington, Idaho, Montana, Wyoming, Colorado, New Mexico, Arizona, and Utah, the largest circulation credited to any publication devoted to engineering and mining is accorded to the MINING AND SCIENTIFIC PRESS, a weekly, published at San Francisco, Cal.; and the publishers of the American Newspaper Directory will guarantee the accuracy of the circulation rating accorded to this paper by a reward of one hundred dollars, payable to the first person who successfully assails it.

Elsewhere it says:

Among the engineering and mining papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco. In fact, it fully equals five times the combined issue accorded to all the others, and the publishers of the American Newspaper Directory will guarantee the accuracy of the circulation rating accorded to this paper by a reward of one hundred dollars, payable to the first person who successfully assails it.

Again, talking of electrical papers, it says:

Among the electrical papers in California, none has credit for so large a regular issue as is accorded to the MINING AND SCIENTIFIC PRESS, published weekly at San Francisco; and the publishers of the American Newspaper Directory will guarantee the accuracy of the circulation rating accorded to this paper by a reward of one hundred dollars, payable to the first person who successfully assails it.

In this regard three things are worth noticing: First, that the above three statements were made as a matter of public record, were unsolicited, not paid for in any way, and emanated from competent authority; second, that no attempt has been made anywhere to deny or contradict any one of the three statements, and that since those statements were made the paid circulation of this paper has increased to an extent that warrants the publishers of the American Newspaper Directory to make an even more favorable statement, unpaid for and unasked, in the forthcoming annual edition of that reliable work; third, so far as known, this paper is the only one of its class that recognizes the right of the advertiser to know its circulation, and publishes it in plain figures.

Concentrates.

THE Los Angeles *Herald* is advocating the building of a smelter at that city.

A 200-TON milling plant is to be built at Freshwater, southwest of Cripple Creek.

ABOUT 250 men are now employed at the Golden Cross mine, Hedges, San Diego county, Cal.

THE Western Federation of Miners will hold a convention at Salt Lake City, Utah, on the 11th inst.

THE railway being built from Robson to Trail, B. C., it is expected, will be open for traffic by May 20th.

NATIVE laborers in the mines on the Rand, South Africa, are paid less than $10 a month in wages on an average.

NATURAL GAS has been found in the city limits of Sacramento by a company that has been boring on Y street.

THE Chloride Point Mining Company at Mercur, Utah, is about to erect a mill with a daily capacity of 200 tons.

BUTTE capitalists are figuring on erecting a smelter either at Twin Bridges or at some point on the Big Hole river.

AT Monroe, Utah, a mountain of mineral paint material has been discovered, which it is proposed by the owners to work.

THERE is a movement on foot to establish a powder factory at Rossland, B. C., encouraged by the raise in price of 3 cents per pound.

LOCAL capitalists are developing six turquoise claims twenty miles south of Santa Fe, New Mexico, recently illustrated in this paper.

STOCK in the Mollie Gibson of Aspen, Colorado, which sold at $12 in its halcyon days, is now quoted at 12 cents on the Colorado Springs exchange.

THE discovery of placer gold on the townsite of Nelson, British Columbia, has caused considerable excitement, and brought in a number of gravel miners.

THE Kaslo-Montezuma Mining and Milling Company have decided to build a mill with 200 tons daily capacity at their property near Kaslo, British Columbia.

THE managers of leading quicksilver mining companies state that the prospects for increased business and better prices for quicksilver for this year are very good.

THE East Kootenay country will attract more than usual attention this season since the building of the Crow's Nest Pass Railway, which will tap it, is assured.

A WEEKLY journal has made its appearance in London which is devoted entirely to promoting mining investments in British Columbia mines in the English market.

THE Canadian Government will send a commission to the Yukon country as soon as travel permits to organize a territorial government, and report upon the conditions.

NOTICE has been given that the Canadian Pacific Railway Company will begin at once to build the Crows Nest Pass railroad, which will mean much to the Kootenay mines.

IT is proposed to erect at the entrance of Liberty Park, Salt Lake City, an archway to be constructed of minerals from the various mines in the State, each camp to have a place in it.

THE gold yield of California for '96 was $17,181,562; for '95, $15,334,317; for '94, $13,923,281; for '93, $12,122,844; for '92, $12,571,900. On page 362 appears the yield by counties for '95 and '96.

PLACER mining in Cripple Creek, Colorado, has been carried on with some difficulty for want of water, until lately the tunnels have increased the flow, and many claims are being worked.

A BILL has been introduced in the British Columbia Legislature to provide for the appointment of an inspector of mines to secure the safety and good health of men working in metalliferous mines.

CAPTAIN J. R. DELAMAR has offered a bonus of $50,000 for the discovery of a process for working in a practical way the so-called arsenical ores of the Golden Gate mine at Mercur, Utah, says the Salt Lake *Tribune*.

IN British Columbia any miner, before working in mines even for wages, must get a Government license, costing $5. It is proposed to abolish this tax, as to the working miner, but not as to the prospector. Poor old prospector.

THE Calaveras, California, *Citizen* states that the Exploration Company of London has secured a bond on the Hall, Bachmann and Big Four mining properties, situated in Fourth Crossing mining district and adjoining the Thorpe mine.

THE Kansas City Smelting and Refining Company have purchased a site of 320 acres for a smelter at Five Mile point, the terminus of the Nelson & Fort Sheppard railway, near Nelson, B. C. The plant is to have a capacity of 300 tons a day.

U. S. CONSUL GENERAL MARETTA reports that the yield of gold in Australia in 1896 was 2,375,948 ounces, an increase of 16,000 over that of 1895. Since 1851 over 100,000,000 ounces have been produced, of which 61 per cent came from Victoria.

THERE are no funds available for continuing the work of the mineral land commissioners in Montana in designating mineral from agricultural lands within the railroad grants, and it is probable that their work will be discontinued for a time.

THE new law of Idaho as to placer locations provides that the locator must place a post or monument at each corner, and within fifteen days after making the location make an excavation of not less than 100 cubic feet for the purpose of prospecting.

A MINE OWNER of Rossland, B. C., makes the prediction that inside of two years there will be 5000 men at work on Red mountain, and not a smokestack will be seen on the mountain, for all the work of hoisting and drilling will be done by electricity.

THE Debris Commission has received applications for permits to mine from Charles and Benjamin Howlett, of the Howlett claim, Columbia Hill, Nevada county, and Marguerite Gravel and Quartz Mining Company in Eureka district, Nevada county.

AT Helena, Montana, Martin Cummings was last week awarded $13,000 damages against the Helena and Livingstone Smelting Company, owner of the Alta mine, for injuries caused by the falling of a rock, which he alleged was the result of incompetency of a miner in the preceding shift.

LARGE ACCESSIONS of membership have been made by several county miners' associations during the past two weeks. In Placer county the collectors announce that the number of members this year will be larger than ever. Among the subscriptions sent in was $30 from the Chinese at the Red Point mine.

THE Castle Peak gilsonite mines, north of Price, Utah, are sending two and three carloads a month to the East to be used in varnish and lacquer making. There are many different qualities in the State and the amount that will be mined will depend largely upon the freight charges. At present only the most valuable can be shipped.

IN Spain there were mined in 1896, at the Almaden quicksilver mines, 22,100 tons of ore. In Asturias, El Porvenia Mining Company raised 7065 tons of ore, the Union Asturiana 4471 tons, and La Soterrana 670 tons. In Granada 800 tons were obtained. At Almaden 16,076 tons were smelted, yielding 41,330 flasks of quicksilver. The total quicksilver production of Spain amounted to 43,884 flasks.

THE proposed exemption of imported mining machinery from duty under the new tariff bill pleases British Columbia in general, with the exception of a small number of engineering firms in the Province which manufacture to a limited extent certain classes of mining machinery. The change will benefit United States manufacturers in California and elsewhere to the detriment of eastern Canadian firms.

IN the Seven Devils district, in Idaho, to which several railroads are contemplating the building of branches for the business of hauling the copper ores, it is claimed that there are in sight 75,000 tons of ore in one mine, which will yield 50,000,000 pounds of copper, and in another 30,000 tons which can be mined without the use of a single candle. Without a railroad these resources cannot be made available.

THE Mexican Government has issued a statement showing that the exports of precious metals for the first six months of the fiscal year 1896-7 amounted in value to $31,787,926, as against $31,556,414 for the same period of 1895-96. There is a notable increase in the exportation in gold and a marked falling off in silver. Gold ores show a rise from $83,343 to $129,662, while gold bullion advanced from $2,541,719 to $2,829,090.

AT the annual meeting of the South Paloma Gold Mining Company, held at their office in San Francisco, April 16, the following directors were elected: John A. Wright, president; Ansel M. Easton, vice-president; C. W. Howard, Jr., Sydney V. Smith, and Mark B. Kerr manager. The shaft in the mine, which adjoins the Gwin in Calaveras county, is down 525 feet, and at 600 feet drifting to the ledge will be commenced.

THE American Flat Development Company is formulating a proposition to be submitted to the owners of mines in American Flat, by which the company will take a portion of the claims for draining the properties with a branch of the Sutro tunnel, and another proposition will be made for an agreement with the Comstock Tunnel Company. It is understood that the latter company is desirous of obtaining the contract for the extension.

THE mineral output of Idaho for the year 1896 has been compiled by Superintendent Church of the Boise City assay office, and shows an advance of over a million dollars over that of 1895. Gold showed a slight decrease, but silver and lead both show increases. The figures are as follows: Gold, 1895, $2,594,666; 1896, $2,323,700. Silver, 1895, $5,214,498; 1896, $6,474,765. Lead, 1895, $2,302,321; 1896, $2,593,380. Totals, 1895, $10,110,485; 1896, $11,751,845.

UNITED STATES CONSUL MCDANIEL writes from Bahia, Brazil, that some deposits of manganese near that city have been bought by a company, and their engineer reports that these mines have proven to be the richest in quantity and quality known, and convenient of access, being situated about sixteen miles from the port of Nazareth, on the railroad between Nazareth and Amargosa. He estimates that over 1,000,000 tons of first-class ore are in this mine.

THE joint committee representative of the leading commercial bodies of Denver, Colorado, appointed to consider the advisability of holding a gold mining convention in that city, has decided to hold the convention Wednesday and Thursday, July 14th and 15th. The members of the committee seem to be of many opinions as to what should be the scope of the business of the convention. Upon that will depend very much as to whether a large attendance may be expected from other parts of the West than Colorado.

A MEETING of the managers of the properties within the city limits of Leadville, Colorado, was held last Monday to consider the question of draining the mines. During last year's strike the pumps were stopped and many of the mines flooded. A plan was proposed and accepted. Ten thousand dollars was subscribed for the preliminary work and $4000 more will be added when pumping operations commence. The mines when drained will put 550 more men to work and increase the output of ore 500 tons per day.

ON January 23, 1897, there was published on page 75, a statement showing in detail that during 13 days there had been received at this office the names of 221 new subscribers. From January 23, '97, to April 24, '97, there were received at this office the names of 638 more. This brief statement of fact illustrates the great increase in the circulation of this paper, and why advertisers find its columns profitable. The 638 are residents of fourteen American States, British Columbia, Mexico, South America and Europe. Of the 638, 118 are residents of California.

IT is understood that the Exploration Company of London has secured an option on the De Lamar mine of Nevada, which has been under examination by Victor Clement and others lately. The report of the management, made in conformity with the Nevada law imposing a tax on the net output, for the quarter ending December 31 last shows that during that period 20,677 tons of ore were put through the mill, the gross value of which was $575,462. From this $77,000 was taken for extraction, $22,000 for transportation and $372,186 for milling, which left a net profit of about $100,000 for the quarter in question.

IN the April *Forum* is an article by William E. Smythe on Nevada, in which he says: "Nevada is the victim of circumstances. Rich in the potentialities of material greatness, and therefore strong in the capacity to support a social structure, she presents the baffling paradox of a declining population in a Western State. If she were located in South Africa, the nations of Europe would plot and struggle for possession of her minerals, lands and waters; if in New South Wales, the Colonial Government would employ the public capital to reclaim her deserts, and enable the surplus population of Adelaide to make homes upon her soil."

JUDGE BRANTLEY of the District Court of Deer Lodge county, Montana, believes little in evasion of the mining laws. In a case recently decided wherein suit was instituted to oust a party that had filed on a claim in good faith, the judge decided that the actual amount of $100 must be expended on a mineral claim in order to hold it. He also decided that the usual wages paid in a district must decide the manner in which the $100 is made up. In this case the parties claimed to have done twenty-three days' work and charged at the rate of $5 per day. The evidence showed that the regular rate of wages was only $3 per day, and so the judge decided that twenty-three days' work would not hold the claim, and rendered a judgment in favor of the defendants.

RIVER DREDGING for auriferous gravels has been made a success in New Zealand, but only partially so in this country, although much attention is just now being paid to that form of mining. Samuel L. Theller has lately purchased the rights for California and Oregon in the Bowers dredger, and it is proposed, under the direction of W. B. Murdock, of this city, to make trials of the dredger for mining purposes. The lifting action of the dredger is by suction, and whatever will go through the inlet pipe of, say, 6 or 8 inches, drawn from a river bed, can be forced by their system of delivery and landed 100 or 1000 yards from the point of operation. That there is abundant opportunity for dredger work there can be little question, and that a satisfactory system will be adopted soon there can be little doubt, for the engineering difficulties are not insurmountable.

THE Ætna Consolidated Quicksilver Mining Company of California, in its report for the year ending December 31, 1896, shows that the receipts from quicksilver sold were $120,236. The expenses, including $4812 for repairs and $4396 for depreciation, were $73,244, leaving net earnings of $46,992. From these was paid in dividends $40,000, or 8 per cent on the stock, leaving a surplus of $6992. The general account shows assets: Plant, $501,712; quicksilver on hand, $37,620; supplies, $6561; cash, $6618; total, $552,511. The liabilities were: Stock, $500,000; unpaid drafts, $2284; total, $502,284, leaving a surplus balance of $50,227. There were 16,392 tons of ore treated during the year, yielding 290,700 pounds of quicksilver; the average tenor of the ore was 8.87 per cent. The earnings were $7.34, the expenses $4.47, and the profit $2.87 per ton of ore. The average receipt was 41.4c per pound of quicksilver, and the average cost 25.2c, leaving a profit of 16.2c per pound.

THE report of the Napa Consolidated Quicksilver Mining Company of California for the year ending December 31, 1896, shows that the receipts from sales of product were $158,838; expenses were $110,202, leaving a profit of $48,236. The dividends paid were $60,000, or 8.57 per cent on the stock, showing a deficit of $11,364, which was drawn from the surplus. The assets at the close of the year included $50,820 quicksilver on hand, $11,756 supplies; $450 cash; a total of $63,026. Liabilities included $33,380 unpaid drafts and overdrafts, and $566 unclaimed dividends, a total of $34,146, leaving a surplus balance of $28,880. There were 17,880 tons of ore worked, from which 382,500 pounds of quicksiver were obtained. The ore thus showed an average of 10.7 per cent metal. The receipts per pound of quicksilver were 41.5c, the expenses 28.8c, and the profit 12.7c. The yield per ton of ore was $8.88, the expenses $6.16, and the net earnings $2.72. The new development work included 5128 feet of drifts and 263 feet of winzes.

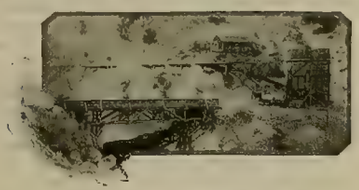
THE Salt Lake *Tribune*, after stating that Utah can boast of a greater list of dividend-paying silver mines than all the world besides, gives the following list of large producers that are now paying profits, with the amount of dividends each has paid: Ontario, $13,400,000; Horn Silver, $5,130,000; Bullion-Beck, $2,117,000; Centennial-Eureka, $1,950,000; Daly, $2,925,000; Mercur, $675,000; Silver King, $1,012,500; Utah, $175,000, Galena, $75,000; Swansea, $36,100; South Swansea, $29,960; Mammoth, $1,150,000. Of those whose dividends have not been made public the Ajax has divided about $1,000,000, the Eureka Hill nearly $2,000,000, Gemini-Keystone $800,000, while large profits have been paid by the Old Jordan, Old Telegraph, Humbug, Julia, Dean and a number of others owned by individuals or close coroporations. Besides these, the Geyser-Marion and Dalton & Lark properties, which are paying dividends, have under the old ownerships paid large sums. Then there are a large number of properties being developed, or upon which milling plants are being erected, that will largely increase the list before the end of the year.

UNDER date of Virginia, Nevada, April 27th, an old experienced Comstock miner writes: "In the East, Europe and South Africa they are constantly proclaiming that the Comstock is played out, ex[illegible]'s for dead. The truth is that no better place in which the rest can be found anywhere in the United States th[illegible] deep levels of the Comstock. Counting from the ne[illegible] throw a established at the 1600 level by the Sutro tunnel, [illegible] 200 fee[illegible]ally attained a depth of only about 1750 feet in our d[illegible] orkings, which is merely a beginning compared with [illegible] ×.012 being done in Lake Superior and other places. The situ[illegible] present on the Comstock for drainage, ventilation and the orking purposes is the same as if 1600 feet of surface m[illegible] had been removed and thrown aside. We can as easily same eyond the 1700 feet attained from the Sutro tunnel le[illegible] own as we could sink below that depth from the natu[illegible]ill urface. Sooner or later work will be resumed in the de[illegible]evels. A start came near being made in 1891; everybody wa[illegible] redhot for it, but finally the scheme fell through just when a start was on the point of being made."

BINGER HERMANN, Commissioner of the General Land Office, writes the Helena, Montana, register and receiver: "Your attention is directed to the fact that by decision rendered by the department on Feb. 27, '97, in the case of W. H. Gowdy et al. vs. the Kismet Gold Mining Company, the decision rendered in said case on May 23, '96, and reported in 22 L. D., 624, was modified, and paragraph 29 of the mining regulations amended so as to read as follows: The claimant is then required to post a copy of the plat of such survey in a conspicuous place upon the claim, together with notice of his intention to apply for a patent therefor, which notice will give the date of posting, the name of the claimant, the name of the claim, the mining district, and the county; whether or not the location is of record, and, if so, where the record may be found, giving the book and the page thereof; the number of feet claimed along the vein and the presumed direction thereof; the number of feet claimed on the lode in each direction from the point of discovery, or other well-defined place on the claim; the names of all adjoining and conflicting claims, or, if none exist, the notice should so state. According to the last decision of the department, the amendment of said paragraph will take effect on the first day of June, '97, and all publications thereafter made must contain the information therein prescribed. All publications made or started prior to that date are to be treated in accordance with the practice of the department existing prior to the original decision in the case of W. H. Gowdy et al. vs. the Kismet Gold Mining Company."

Tintic District, Utah.

Utah occupies the pleasant prominence in the mining world of having paid to date an even



UTAH MINE, EUREKA, UTAH.

$33,000,000 dividends on mining stock companies operating within its borders. The old Mormon policy of discouraging mining operations has been disrailroads, with just recognition of business requirements, have made many inducements in the way of transportation. Juab county is particularly favored in this regard. In '96 Tintic district (reached quickly and easily from Ogden and Salt Lake City by the Rio Grande Western Railway) yielded $5,000,000 in gold, silver, copper and lead, and declared dividends aggregating $1,725,500.

On this page is illustrated the prosperous mining camp of Eureka, a place of 3000 population, where at an altitude of 6500 feet has been extracted many million dollars' worth of ore, and where have been fought out several legal contests over that much vexed matter of "apex" and "side lines," which constitutes one of the puzzles of American mining law. At Eureka are the Eureka Hill mine and mill, illustrated herewith, where 110 men give a daily output of 150 tons; there is a double compartment shaft down 1100 feet, and there are twenty-five miles of underground track. West of the Eureka is and a daily output of 50 tons, which averages 60 ounces silver and $14 gold to the ton; poorer ore is



MAMMOTH STATION, R. G. W. RAILWAY, AND FARRELL MILL.

mined and stored pending the completion of a large mill.

South of Eureka, in "Mammoth Hollow," is the



VIEW OF EUREKA, UTAH.



MAMMOTH MINE, MAMMOTH.



MAMMOTH MILL, MAMMOTH.

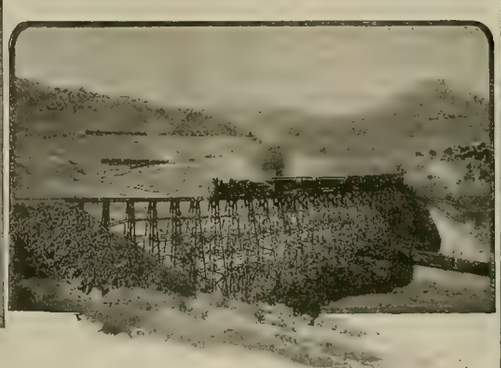


CENTENNIAL-EUREKA MINE, EUREKA.

carded the past twenty years, and the mineral resources of the youngest State in the Union are being developed. Utah is fortunate in several matthe Bullion-Beck, also depicted, one of the biggest "base ore" mines in the country, running about 55 ounces silver to the ton and 15 per cent lead. About Mammoth, the deepest mine in Utah, the present workings being 1800 feet below the level from which the main shaft starts. The Mammoth is one of



EUREKA HILL MINE AND MILL, EUREKA.



DOUBLE CIRCLE, TINTIC LINE, R. G. W. RY.



BULLION-BECK MINE AND MILL, EUREKA.

ters regarding such mining development: coupled with rich deposits come the pleasant facts that there have never been any serious labor troubles, that most of the camps are easy of access, and that the 240 men are employed, the daily output being over 300 tons. This company has paid dividends aggregating $2,500,000. North of the Eureka Hill is the Centennial-Eureka, with a main shaft 1500 feet deep, Utah's gold mines. In the mill are sixty 1000-pound stamps. When the present additions are complete the mill's daily capacity will be 300 tons.

In the immediate vicinity are many other mines in

every stage of development, contributing to the aggregate output of the district and giving promise of continuity.

The Rio Grande Western Railway Co. has just issued another of its handsome publications, which contains much authentic information about Utah's mines in general and Tintic district in particular, and which can be had upon application to Mr. F. A. Wadleigh, Gen. Pass. Agt., Salt Lake City, to whom we are indebted for the use of the illustrations in this brief notice of a rich district which the railroad has done much to develop.

Practical Notes on Hydraulic Mining.*

NUMBER IV.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE H. EVANS, C. E., M. E., General Manager Cons. G. Mines of Cal., Ld. Oroville, Cal.

Fifth—Another set of formulæ given in "Practical Hydraulics," by Thos. Box, are as follows:

Where d = diameter of pipe in inches. L = length in yards. H = head in feet. G = gallons discharged per minute.

$$d = \left(\frac{G^2 \times L}{H}\right)^{\frac{1}{5}} \div 3 \qquad L = \frac{(3d)^5 \times H}{G^2}$$

$$G = \left(\frac{(3d)^5 \times H}{L}\right)^{\frac{1}{2}} \qquad H = \frac{G^2 \times L}{(3d)^5}$$

Example 1. Find the diameter of pipe required to discharge 300 gallons per minute with 80 feet head; length of pipe, 200 yards:

$$d = \left(\frac{300^2 \times 200}{80}\right)^{\frac{1}{5}} \div 3$$

	Log's.
300 =	2.4771
	2
300^2 =	4.9542
200 =	2.3010
	7.2552
÷ 80 =	1.9031
5 |	5.3521
Fifth root =	1.0704
÷ 3 =	0.4771
	.5933 = 3.92 inches diameter.

Example 2. Find the number of gallons discharged by a pipe 10 inches in diameter, 900 yards in length, with a head of 50 feet:

$$G = \left(\frac{(3 \times 10)^5 \times 50}{900}\right)^{\frac{1}{2}}$$

	Log's.
3 × 10 = 30 =	1.4771
	5
Fifth power =	7.3855
× 50 =	1.6990
	9.0845
÷ 900 =	2 9542
2 |	6.1303

Square root = 3.0651 = 1162 gallons per minute.

Example 3. Find the head necessary to discharge 120 gallons per minute through a 6-inch pipe 500 yards long:

$$H = \frac{120^2 \times 500}{(3 \times 6)^5}$$

	Log's.
120 =	2.0792
	2
120^2 =	4.1584
× 500 =	2.6980
	6.8574
Log. 3 × 6 = 18 =	1.2553 × 5 = 6.2765
	.5809 = 3.81 feet.

In all these examples care must be taken, and more especially in short pipe lines, to allow for loss of head due to velocity at entry, also for friction of the water against the sides of the pipe.

Example 4. Given diameter of pipe in inches, and velocity in feet per minute to find discharge in cubic feet or gallons per minute. $Q = 0.32725 \times d^2 \times V$ = cubic feet per minute, and cubic feet per minute multiplied by 7.48 = gallons per minute.

Sixth—In constructing a pipe line, care must be taken to place air valves at all high places, blow-off valves at all low places in the line, and when the line is subject to extreme heat and cold, it is absolutely necessary to provide at least one good expansion joint each half mile.

Another excellent precaution is to place near the lower end of the line a safety valve, either the spring or ordinary level kind, and set it at a pressure slightly above the maximum due to the head, then when gates are closed too quickly by careless attendants, the valve will relieve the shock, instead of allowing the whole line to be strained.

All gates should have outside screws, and the threads on them fine, so that it will be impossible to open or shut them too quickly. The careless opening and shutting of gates has wrecked many a good line.

It has always been my rule to place tell-tale gauges in the main lines a few feet behind a main gate, and from such a gauge one can easily see whether the water was turned on or off slowly, and it should be an invariable rule to discharge any man that handles a gate in a careless manner, after once being warned by those in charge of the works.

Seventh—With reference to the numerous devices for joining pipe, I have no hesitation in recommending that all pipes near and around the workings of the claim, should be furnished with angle iron flanges. In this country they are certainly the exception to the rule, but if once used, no other kind of connection will be tolerated.

It is often necessary to find the quantity of water that will be discharged through a sluice gate with side walls, and the number of gallons per minute that will flow through under certain heads may be found by the following easy formula:

In determining the head of water care must be taken to measure from the center of the opening in sluice gate to surface.

$$G = 8.025 \times \sqrt{H} \times .6 \times A \times 6.23 \times 60.$$

$$H = \left\{\left(\frac{G}{6.23 \times 60 \times A}\right) \div .6\right\}^2$$

Where G = gallons per minute, H = head or depth of water from surface to center of sluice opening, A = area of opening.

Example: How many gallons per minute will be discharged from a reservoir through a sluice gate with side walls, when the depth of water above the center of the opening is 7 feet and the opening is 2 feet wide and 1 foot high?

Answer: $G = 8.025 \times \sqrt{H} \times .6 \times A \times 6.23 \times 60 =$

$8.025 \times \sqrt{7} \times .6 \times 3$ ft. $\times 6.23 \times 60 = 14281.785$ gallons per minute. Which ÷ 11.25 = 1269.49 miners' inches.

Again, if it is required to find the head or height of water above center of opening in a sluice gate necessary to discharge 14,300 gallons per minute through an opening 3 feet by 1 foot, we proceed as follows:

$$H = \left\{\left(\frac{G}{6.23 \times 60 \div A}\right) \div .6\right\}^2 \text{ and in this instance}$$

$$H = \left\{\left(\frac{14300}{\frac{6.23 \times 60}{8.025} \div 3}\right) \div .6\right\}^2 =$$

$$\left\{\left(\frac{14300}{373.80} \div 3\right) \div .6\right\}^2 = \left(\frac{38.25 \div 3}{8.025} \div .6\right)^2 =$$

$$\left(\frac{21.25}{8.025}\right)^2 = 2.64^2 \text{ or } 6.96 \text{ or nearly 7-inch head.}$$

In many instances a sluice valve is used instead of a gate, and when the pipe attached to the valves is comparatively short, say of a length not exceeding more than three diameters, the following formula may be used:

Where G = gallons per minute, H = head in feet or height of water above the center of the valve opening, d = diameter of valve opening in inches.

Example: How many gallons per minute will a sluice valve 10 inches in diameter discharge when the height of water is 3 feet above the center of valve opening?

Answer: $G = \sqrt{H} \times d^2 \times 10 = \sqrt{3} \times 10^2 \times 10 =$ 1732 gallons per minute, or 1732 ÷ 11.25 = 153 miners' inches.

Example 2. With same measurements find the head required to discharge 1732 gallons per minute.

Answer:

$$H = \left(\frac{G}{d^2 \times 10}\right)^2 = \left(\frac{1732}{10^2 \times 10}\right)^2 = 3 \text{ feet.}$$

Example 3. To find diameter of valve necessary to discharge same quantity of water with same head as in examples 1 and 2.

Answer:

$$d = \sqrt{\left(\frac{G}{\sqrt{H} \times 10}\right)} = \sqrt{\frac{1732}{1.732 \times 10}} = \sqrt{100} = 10$$

inches diameter.

In connection with the last formula it must be borne in mind that if the pipe leading to the sluice valve to reservoir is much larger than three diameters, allowance must be made for friction, etc.

Nozzles.—Nozzles require great care in construction so as to be of correct form, and perfectly smooth in bore, in order that the water leaving them will be in a solid stream, instead of scattering and thereby losing power, as is the case with nozzles of improper construction. In order to get the best effect from any kind of nozzle, it is absolutely necessary that the head of the supply pipe should be 3 or 4 feet under water, to avoid air getting into the pipe and causing the water to scatter when leaving the nozzle.

To determine the velocity and discharge in cubic feet per second for well-made nozzles, either of the following simple methods may be followed:

First—Multiply the square root of the hydrostatic or effective head in feet by 8.03. This will give the velocity in feet per second, and that multiplied by the area of the discharge end of the nozzle in square feet will give the discharge in cubic feet per second, which, multiplied by 40, will give the answer in miners' inches. Example: Nozzle 4 inches in diameter, discharging water under an effective head of 400 feet, find velocity and discharge. The square root of the head—or 400 feet—is 20, and 20×8.03 equals the velocity in feet per second, viz., 160.60. Area of 4-inch nozzle in square feet =.087266, and this multiplied by 160.60=14 cubic feet per second, or 14×40=560 miners' inches. The result obtained by this rule is nearly the theoretical discharge, while for ordinary practical results the actual discharge will be from 75 to 85 per cent of the answer obtained by this rule.

Second—To find the discharge in gallons per minute, use the following formulæ: $G = \sqrt{h} \times^3 \times .24$. Where G = gallons discharged per minute, h = hydrostatic or effective head on nozzle in feet, and d = the diameter of nozzle in ⅛ths of an inch.

Example: Find the discharge from a nozzle 3 inches in diameter with a head of 205 feet. The square root of the head viz: 205 is 14.317 and the diameter in ⅛ths of an inch is 3×8=24, which squared is 24×24, or 576. Therefore, G = 14.317×576×.24 equals 1979 gallons per minute, and this divided by 11.25 = 176 miners' inches.

For accurate results the following two rules may be followed:

First—Discharge in cubic feet per second = $\sqrt{2 \times g h} \times a \times 0.96$, where g is the acceleration of gravity in feet per second, commonly accepted as 32.2 h = the hydrostatic or effective head in feet, and a = the area of nozzle discharge in square feet.

Second—Discharge in cubic feet per second = $\sqrt{h} \times d_2 \times G$ where h = the effective head in feet, d = diameter of nozzle in ⅛ths of an inch, and c = a variable co-efficient from .00064 to .00066.

It is a well known fact that water issuing from a nozzle should theoretically attain the height of the head. For instance, a nozzle with 300 feet effective head should throw a stream a height of 300 feet, but we all know this efficiency cannot be reached in practice, owing to the resistance of the air, and other causes, but the difference has been found by experiment to vary nearly in inverse ratio to the diameter of the jet, and in "Practical Hydraulics," by Thos. Box, we have a formula for approximately calculating the loss of head for each case, which is as follows: $h' = \frac{H^2}{a} \times .0125$. Where H = the effective head on the nozzle in feet, h' = the difference between the head and the height of discharge column from nozzle. d = the diameter of the jet in ⅛ths of an inch. Mr. Box goes on to remark that as a result of this rule each size of nozzle attains a maximum height with a certain head, and when the head is increased beyond that point, the nozzle does not throw the stream so far, but, on the contrary, the efficiency of the nozzle greatly diminishes; a good deal owing to the fact that an excessive head, or more plainly speaking, a head out of proportion to the diameter of the nozzle, tends to scatter the issuing stream and cause it to meet with more resistance from the air than a jet of solid water issuing with a moderate head.

Adopting Mr. Box's formula we will work out the following, and see the result:

First—At what distance will a well-formed nozzle of 2-inch diameter throw a stream of water having an effective head of 200 feet?

Answer: $h' = \frac{200^2}{16} \times .0125$ or $\frac{40000}{16} \times .0125 = 31.25$.

Therefore, the height the nozzle will throw is 200—31.25, or 168.75 feet.

Second—Take the same nozzle, with a head of 450 feet, and the loss will be $\frac{450^2}{16} \times .0125$ or $\frac{202500}{16} \times .0125 = 158.20$ feet. That is to say, the water will be discharged to a height of 450—158.20, or 291.80, feet, instead of 450 feet, the theoretical height minus all friction due to the head.

(To be Continued.)

THE following is stated to be the composition of a number of Japanese alloys hitherto kept a close secret, and now revealed by workmen making them. The "shadko" is an alloy of copper and from 1 to 10 per cent of gold; the objects are placed in a mordant of sulphate of copper, alum and verdigris until they have assumed the coppered or blue-black hue of swordsheaths and decorative articles. "Gni-shi-buichi" is a copper alloy with 30 or 50 per cent of silver of the well-known gray color. "Mokume" is a compound of several alloys. About thirty plates of foils of gold, "shadko," copper, silver and the last-mentioned alloy are soldered together, holes are made, the plate hammered out and put in the mordant. The finest Japanese brass, "sinchu," consists of 10 parts copper and 5 of zinc; of bell metals, "karakane" is made of 10 parts of copper, 4 tin, ½ iron, 1½ zinc, the copper being melted first and the other metals added in the above order. Other proportions give inferior bell metals.

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The Conservation of Intellectual Wave Forces.

TO THE EDITOR:—In your valuable paper our attention is often arrested by problems pertaining to light, vibration, electricity and magnetism—all interesting and stimulating to our conceptions of the material activities in the universe, with a constant desire to have them subserve the interests and progress of man. The mind is sometimes bewildered at the possibilities presented, and when revealed in glimpses of possible truths in new relations, abundant food is furnished for active reasoning, foresight and investigation, and with this thought in view, I desire to present to your readers a succinct account of some radical ideas and conclusions as reached by Solomon J. Silberstein, 311 East 74th street, New York, and set forth in a recent book (300 pages) under the title of "The Disclosures of the Universal Mysteries." I cannot undertake to cover the ground in this communication, but hope to be able to give tangible expression to some of the ideas advanced which will repay perusal, and, from a somewhat necessary fragmentary presentation, oblige the reader to imagine the argumentative links.

In the first place, Mr. Silberstein, as a basis for his theories, does not accept any deductions that relegate intelligence from the original and persistent energies of the universe. Absolute intellectuality is sole factor in the last analysis and is the only real existent element that was, is, and ever will be, eternal, without beginning and without end. Every object, all objectivity in the universe and particularized being, is but a chain of tendencies, activities, accentuating and perfecting themselves through the impartial impulses and vibrations originally set up in the formulative atom; adjusted and readjusted by accumulations in the transforming order of evolution, involution, and motor forces generated in the method, insuring continuous life and perpetuating activities. The questions at once arise: What hypothesis is most warranted in settling the question? Did matter, as we understand it in its incipient state, have motion, force or energy communicated to it from *outside*, or was such energy inherent in it? Has matter ever existed, commonly understood as extension, in an ever-present condition? As a further basis, Mr. Silberstein claims as co-existing with intelligence, an absolute essence, that is formless in itself, but partakes of the embryo character, and is, as it were, the offspring of the universe as a whole, characterized, as the medium between the absolute mind and actuated forms, the non-absolute forms, that appear and disappear, re-appear transformed, re-formed, some rising above the sub-conscious into the threshold of self-consciousness, entailing a conception of its own relation to the divine intelligence. "The intellectual being of the universe is conceived to be—the ideal concept of the universe as a whole. The intellectual universe, as a consequence, cannot be thinkable to exist or to be enclosed in any physical thing behind intellectuality. Intellectuality, therefore, has not any other attribute, nor any mode of matter and force, but pure absolute intellectuality, the pure mathematical bond of the universe as an intellectual substance in an eternal being, standing by itself, without change in all eternity. The extension, or matter and force, can not be an attribute of God as a unit in Him just as intellect (as Spinosa thought), but a separate creation made of Him. * * * Absolute intellectuality, which is not material, embraces all abstract images without end in one perfectly absolute generality, in the one intellectual being; so that in the knowledge of every one of the mental images in the absolute intellectuality is contained the knowledge of all mental images of eternal existence, and that every one of the mentally separate images are perfectly known and conceived one in the other in their mutual intertwined relation in the one pure absolute generality." The key to Mr. Silberstein's solutions appear to rest in what he calls the "centrality of motion," which in its ultra interior meaning expresses the innermost tender and spiritual waves of thought, the resultant of cogitation and a reflexion of the light of intellection in its infinite notation of infinite change in the vibratory action of related activities.

"Particularized compound objects are not emanated from the very light of the mind, from the essence of intellectuality; nor do they issue forth from the essence of the universe to assume an individual existence, so that the objective appearances should have an objective separated existence of any kind of any reality. But inasmuch as the essence of the universe issues forth from the very light of the mind, as a radiation of the intellectual waves or as a photographic image, its absolute emanation becomes a general activity in the universal essence; and by this general activity the universe is actuated. It vibrates in spiritual waves and reveals itself according to time and to place in particularization, coming one from the other and one after the other as they are conceived one in the other in the absolute mind, in the essence of intellectuality itself. * * * The physical waves which appear before us in the forms of particularized compound objects, in different states of energy, in magnetism, electricity, heat, light and so on, changing one into the other and balancing each other in time and place by a non-absolute existence in the objective world, are contained in and are nothing else but the spiritual waves of the universal essence, the substantiations of the general activity, in an absolute existence." The absolute mind embraces all that wisdom can conceive in one absolute generality; through the whole intellectual waves springs up the universe as a whole, its one generality, at once, by one eternal general and absolute emanation. The general emanation of all compound objects in general, as they exist in potency in the universal essence, is as absolute an existence as that of their existence in the absolute mind itself."

The science of geometry supposes a fixed point as a premise to its conclusions, and scientists reduce matter to elementary bodies or elements, upon which to base their conclusions in experimental philosophy, all of which answers a purpose as far as determining to what extent, and in what manner, their combinations can be made available for progressive action and economic use. But the truth remains, according to Mr. Silberstein, "that nature itself knows not of those elements which our scientists have invented, for it is one eternity, contained in one absolute essence, in which there is absolutely no change and no variation."

The excitations in the universal essence by the cogitations or vibrations of intellectuality express themselves at the crest of the spiritual sources or points of potential excitation in the first forms of primordial matter of atomic proportion, which points become centers of motion, following the laws of intellectuality, being equal to each other in quantity and in quality, equally distanced one from the other in their first formation only, but in their multitude of combinations, subtractions and additions, represent in their various combinations all the particularized beings and objects perceivable in the universe of objectivity as represented to our senses, but they are not properties of matter, but modifications of transformations in that general activity of molecular density, motion and change. It is in Mr. Silberstein's theory and explanation of motion and energy in the atom that he finds proof of nature's laws and evidences that upset many (not all) of Newton's affirmed laws of attraction and gravitation, and obliges him to pronounce them, as well as many other scientific conclusions, absolutely false. While it might require long and detailed extracts from his book to substantiate his statements conclusively to the reader of this article, a careful student cannot but be impressed by the arguments and facts advanced in his philosophy; and perhaps what he has to say about "matter and force" will cause a better understanding of his metaphysical and mechanical application. In this chapter he says:

"The general force which brings forth the atoms in their actual existence is the same force, by the same action or impulse, that keeps them in their state and form. The atoms, although they are indivisible and conceivable only by our intelligence, are still distinct dividuals, each of them separately occupying some space, and are, therefore, capable of being intellectually conceived as consisting of a number of constituents—of parts, that go to make up this individual body—the atom, since the space bounded by the atom can be conceived to be infinitely divisible. That force must be located, therefore, in the center of the atom, whence it exercises its binding influence on all parts equally. For the general force of transformation is not a material force; it is not produced in an object through its material formation after it is formed, that its exercise should be properly qualified to the whole mass or volume of that object, or to exercise its whole power in every particle of matter of that object alike. But it is a spiritual force, and remains always the same; its action or impulse is the spiritual vibration of the universal essence, which occupies no space, through which spiritual points are thrown off from their potential state—from their generality into their individualizations; and in that moment, when the spiritual points extend themselves in space, becoming individualized in the form of matter, the spiritual force remains absolutely the same in the absolute emanation, which is the intellectual light of the intellectual waves of intellectuality itself, which is never extensible.

"The impulse of the spiritual force itself is to transfer all objects from their generality, in which matter and force are absolutely one, into their individuality, in which matter and force are separately perceived, and, therefore, the force cannot be extended with the atom in space; it cannot fill up or occupy the whole volume of the atom, but it must remain in the absolute emanation and must be located in that spiritual point as it was before in its generality, before it becomes extension; that point I call the center, and that spiritual force which is located in the center I call—centrality. The definition of the word 'force' in my whole system is, therefore, the power of conservation in every body, which is the force of centrality. Its impulse is to keep the atom or the body in its peculiar state and form, and there is no other force in the center besides the centrality. We must, therefore, conceive the atoms in the first moment of their creation, being extended in all sides alike, as regular spheres, whose radii were equal. The force of centrality is the one tender or innermost force or principle in the universe which holds and correlates the universe together in one gradual, harmonious and eternal scale of creation, according to fixed, immutable and unvarying laws of nature, which are the laws of intellectuality, the God of the universe."

"The force of centrality, bringing forth the atom in its individual state, brings an excitement in each and every conceivable point or part of the body of the atom, producing thereby a vibration in all its parts. The excitement of the atom is the act of the influence or reflection of the force of centrality in the center through which the matter of the atom is acted upon; by receiving the actions of the force the matter becomes vibrating, producing the motion in matter. Thus, the force of centrality is the active force, while the force of motion is passive. As long as the force of centrality acts in the matter of the atom, there is motion in matter. Should, however, the force of centrality cease to exist, the motion, together with the matter, would, then, also cease to be in existence.

"The influence of the force of centrality, yielding and imparting itself to all parts of the atom, diminishes itself according to the square of the distance from the center. The atoms, although they are physically indivisible, because they are not composed from, nor can be divided into simpler forms of matter, yet, since they are distinct individuals, and extend themselves from their spiritual state—from the center—each of them separately occupies some space, they, therefore, consist of a certain number of constituents — or parts — however small, that go to make up this individual body—the atom—that it should be able to occupy a limited portion of space. So that we are able to draw imaginary circles in the body of the atom around the center till its circumference, the sphere nearest to the center, will be the smallest and the sphere bounded by its circumference the greatest. The centrality being conceived to exist in the center, its influence to keep the body of the atom in its individual state, in order that no particle of the body should remove from the center, exercises with its whole power in the parts of the first imaginary sphere, four times weaker in the parts of the second, nine times weaker in the third sphere, and the weakest at the circumference of the body. For the distance of the second sphere from the center is two times greater than the distance of the first sphere, the spherical activity in the second is, as a mathematical consequence, four times weaker. The third being three times greater than the first, the spherical activity must be nine times weaker, and so on; so that the influence of centrality divides itself in as ever so many parts. Hence the above law, that the influence diminishes according to the square of the distance.

"The vibration of the particles of the atom is quite the reverse; it increases according to the square of the distance from the center. It is the greatest at the circumference and nought at the center. * * * The particles of the body of the atom can never remove from the center to occupy a larger space, for the spiritual force of centrality bringing the atom in its individual state holds the body as such; from the moment the atom becomes extension it can extend no more or less than it is. Those particles, again, cannot keep their place, for the motion compels them to move. There must be, therefore, a generated resultant force, combined of the two, to regulate the power of the two forces. * * * Each and every particle of the circumference of the atom looking eastward has the tendency to move in a straight line eastwards. The other particles looking westward do the same in an opposite direction. The shape of the atom must be, therefore, changed into another form by such a mechanical way by its own impulse. While the parts of one side tend to move in their direction, the parts of the other side keep them back; and thus it is with all sides—the motion of all the sides incessantly jumps back to the center, bringing thereby a new excitement into the center. The centrality, therefore, changes its position in the atom, so that the shape of the atom is changed from a spherical one into an oval form, longer in one direction and shorter in the other, more massive in one end of the long diameter and thinner at the other."

In such a form the resultant force came into play, to bring the atom in a circular motion around its own axis. This resultant force is a mechanical result. The impulse of centrality is only to keep the body of the atom in its state, in order to be an atom in its certain volume and mass, no more and no less, and has entirely no power to attract any particle to the center. The first conception of matter and the first cause of the physical universe is positively the extension alone, caused only by the same force of centrality, and, therefore, no force of "attraction or gravity" in matter can be thinkable; for were any force of attraction or that so-called force of gravity in the center of the atom, or in the center of any body, then no extension could ever be possible in the universe; the property of extension, as well as its term, is positively contrary to the term and prop-

erty of gravity. The matter itself, from its very beginning till the highest development of bodies, possesses only the one and the first property of extension, to be diffused from the center into more space, not to be attracted to the center. Thus, the impulse of centrality, as it is not a force of gravity, is not a direct opposite force to the motion; it serves only as a resistance to it, and, in the same time, it produces motion. As a final result, an elliptical way is produced in the universal space with which the long diameter of the atom makes a certain angle, establishing two absolute universal laws in nature: The first law is that every individual object in the universe is in constant motion, inherent in itself, and the second law is, that the motion in every object must be modified in an internal double motion."

How these atoms meet and join others, forming compact molecules; how these spaces between the atoms and molecules represent different degrees of porosity, and the presence of the universal essence whenever matter can be postulated; how the atomic weights and the relation of the elements thereto are reduced to formulas only of molecular density and their influences; how the application of this theory of motion explains Kepler's laws, as well as the planetary motions; how every existing thing of the whole physical world, in whatever state or form it may be, possesses its own force of existence as its own property, or each of them possesses a part of that general force of universal existence, he epitomizes as follows: "Thus all objects of the world are in an eternal struggle of existence—in offensive and defensive states—in action and resistance to action." To see all these thoughts further elaborated, I would recommend the book itself, upon which the author has bestowed a life of laborious study.

EZRA W. KEELER.

San Francisco, April 9th, '97.

The Great Northern Gold Field.

Written for the MINING AND SCIENTIFIC PRESS by ALMARIN B. PAUL.

When we take into consideration that the land embraced in the counties of Shasta, Trinity, Siskiyou and southern Oregon, according to the views of eminent geologists, was the first of the mineral ranges to raise above the ocean, and from the further fact of these localities being the seat of great volcanic action, we can begin to reason as to the cause of such a widespread quartz stratification and of the great golden possibilities of these northern sections when capital shall be found bold enough to delve deeper into the bowels of these mineral ranges. That age has much to do in the formation of metallic deposits and the maturing of them, no one in these later days questions, whether the mineral be gold and silver, copper or iron.

These northern sections, from unexplained reasons—notwithstanding their large outpourings of gold in the earlier days—for the past thirty-five years have received but little attention, excepting from the very few, in comparison to such sections, as are embraced in the counties of Amador, Tuolumne, Calaveras and Nevada. The "Mother lode" has its charm, and many believers, and while it is unquestionably an important and valuable mineral zone, it is not detracting anything from it to say there are others in California that with the same expenditure of capital in development, judging from surface indications of these parts, have equally as inviting an appearance. When it comes to the gold yield per capita in the past, and the quartz outcrop of the present, these northern sections are by no means inferior, and more than inviting for enterprising capital.

The great drawback to this mineral field has been lack of large capital—capital in proportion to the deposits of quartz veins to be found—and not to the lack of faith by the owners of mines, who lay by and hold on to their locations year after year in an abiding faith that in time the hidden treasure below will through some agency put them "on velvet."

When we view the awakening mining spirit and the strides made in the past ten years in improved machinery, in every department of mining, and the same advance in systems by which a high per cent of the ores' value can be extracted at a comparatively nominal expense, we feel as though we can say to the "hard-fisted" quartz prospector that your time is close at hand.

Speaking of mineral zones, from near Redding in Shasta county, and running northerly into southern Oregon, is a mineral belt fully sixty miles or more in width, with every elevated section filled with quartz croppings carrying gold, silver, copper and iron. Gold is generally the predominating metal, though at times it is copper, and in some localities are large iron deposits.

Commencing on the east side of the Sacramento river, and only about six miles above Redding, is the beginning of a belt of gold-bearing quartz. It is in this zone that are located the companies known as the Original Quartz Hill, the Calumet, Walkers, Reid Group, Old Spanish, Mammoth, Central, Hart's Texas Consolidated, Garfield, National, and possibly fifty others that could be named. There is but one property having any especial depth and this is the Texas Consolidated Co., better known as Hart's. Mr. R. G. Hart, president and manager, has been untiring in his labor of development, and for it deserves the greatest credit. Not over 200 feet in depth can be claimed by any of the others, and here the majority of lodes run from 3 to 15 feet in width.

The Texas Consolidated has a development of 1050 feet. This mine has been for years a paying property—first with a five-stamp mill, now increased to a twenty-stamp mill. It is now actively and prosperously at work, showing that development in depth is what this northern section requires to make it one of the great gold-producing parts of California. All of the above named mines and locations are embraced in a distance of, say, six miles in length and two miles in width, and this is but one of many similar zones.

On the westerly side of the Sacramento river, and parallel to the before-mentioned mineral range, and reaching westerly to Clear creek and beyond through Trinity county and northerly into Oregon, is a mineral belt of large proportions. In this section west of the Sacramento river, also some six miles above Redding, are the works of the Mountain Copper Co., Limited—an English company under the efficient supervision of Mr. A. J. Hill. This institution has become, in the short period of little over a year, one of the most extensive and enterprising companies in the State of California. The mine of the Mountain Co. carries some 15% of copper, with a fair value in gold and silver. The lode varies in width from 30 to 300 feet. It is an immense deposit, and yet not over 300 feet in depth.

Moving north towards Squaw creek there are quartz outcrops without number, and varying in width from two to forty feet; and yet, with the exception of the Uncle Sam, there is but a limited development in depth. In this section is the Balakalla group—an immense mineral deposit, having a trifling development, but showing a flattering outlook for profitable expenditure in works.

As to Siskiyou county, on all its higher ranges are quartz veins in any number, yet, save the Black Bear and Gold Run mines, there is but a limited development. As stated, this mineral zone runs into southern Oregon, and here there is less development than in the northern sections of California. As to Trinity county, it has its record as a gold-producing one, especially in gravel; and as all the gold comes from quartz, it may be considered a good quartz section. But save about French Gulch, where there are several fairly worked mines in depth, no large amount of work has been done.

No mine approximates development sufficiently to show its true value short of 1000 feet in depth, and there is no promising lode at the surface but what will be a paying proposition at some point of its 1000 feet development, and the sooner California miners realize this fact and impress it strongly on their minds, as do the English, the more successful in their mining ventures will they become. Some few have, and good returns have been their reward, and this fact should be an incentive for others. To thus develop lodes, I am aware, requires large capital; but a one-tenth interest in a property, having 1000 feet development, will have a greater value than has the whole vein with 100 feet development. Every proposition for development should be well considered by mine owners, as development only opens up the value of any quartz deposit.

The Congress, Arizona, Mines and Mill.

The Congress mines and mill are on the south side of the Date mountains, overlooking the Hassayampa valley, sixty miles south of Prescott, and seventy miles north of Phœnix, Arizona. The four miles of railroad operated from Congress junction, on the main line of the Santa Fe, Prescott & Phœnix railroad, to the mines and mill of the Congress Gold Mining Company, belong to the latter company.

The mines output daily about 110 tons of ore, the present milling capacity, and about 400 men are employed. In the mines and mill the men work eight and ten-hour shifts.

The underground developments are pushed constantly, the main shaft (on an incline of 22°), being 1750 feet deep; 600 feet east of the main shaft is a second one 1150 feet deep; 1000 feet west of the main shaft is a third, 850 feet deep, and which the management contemplate sinking to the 3000-foot level. Both the second and third shafts connect with the main shaft by drifts, on the vein from which stoping is going on.

The vein is a remarkable one in some respects, there appearing to be no break in it as far as development has gone, to the 1700-foot level. It dips at an angle of 22°, and the vein matter, which is a hard, white quartz, runs in marked uniformity of width, averaging about 20 inches. The main shaft is lighted by electricity. The trackage, on which the ore cars run up and down the incline, is of 40-pound railroad iron. Levels are run at every 75 feet. The ore carries pyrites of iron and no free gold, and the values have held about the same uniform figure throughout. The general run of milling ore averages about $20 per ton. Ores from high-grade streaks, running approximately $200 per ton, are shipped directly to the smelters. Besides the main vein, which thus far has been the principal producer, the company is opening two others, one above the Congress and one below, the latter being in the foot walls of the Congress, and parallel with it. To develop the lower vein a crosscut is being driven on the 1400-foot level, which is now in about 500 feet. It is believed that by thoroughly opening the latter vein, the capacity of the property will be doubled. All shafts have steam hoists; air drills are used in sinking and drifting.



VIEW OF CONGRESS, ARIZONA, SHOWING MINES AND MILL.

The mill has forty 850-pound stamps, 93 drops per minute, dropping 6 inches, crushing 110 tons of ore every twenty-four hours. The screens used are 20-mesh. Twenty concentrators are used; 75 per cent of the values are saved. The tailings run into settling tanks, from which 85 per cent of the water is pumped back and used again. From the tanks the tailings are run into beds and, when dried, from there to the cyanide mill, elevated to storage bins, and automatically dumped into a 100-ton roasting furnace. The roasted material is automatically dumped into a bin, from which it is elevated into the cyanide tanks. By this process about 90 per cent of the remaining 25 per cent of the ore values are recovered, making a total saving of about 97½ per cent of the gold values in the ore.

The future plans of the company contemplate the erection of a new mill on the same plan as the present one, for the purpose of increasing their milling capacity. In the proposed new mill, 1000-pound stamps will doubtless be put in. The concentrates are shipped to the Consolidated Kansas City reduction works at El Paso. The supply of water is pumped one mile, and raised 500 feet, to convey it over a range of hills to the property.

Congress, Arizona, April 14th, '97. WASCOTT.

Scientific Progress.

Watt and the Measurement of Power.

By WM. H. PREECE, C. B. F. R. S.

James Watt's greatest invention—which has been most prolific in exciting further improvements in the steam engine, and which has supplied the engineer with a new sense—is, perhaps, the "indicator." He also brought into use the term "horse power." Watt, in introducing the steam engine, found the chief competitor he had to meet was the horse. It worked the pumps in mines and brewhouses; it drew the ores to the surface: it was employed for grinding and for milling. It was clear that his customers would compare the performance of his engines with that of their horses. He determined by experiment that a good horse working continuously could raise 22,000 pounds 1 foot high in one minute. He thought he would go "one better," so he said, "I will call 33,000 pounds raised 1 foot high in one minute a horse's power." Thus he gave his customers the advantage of 50 per cent more work; but he did more, instead of compelling them to keep relays of horses each of which could not work continuously more than six or eight hours he gave them a machine which worked continuously throughout the twenty-four hours.

The above definition of a horse's power was singularly unfortunate. It means fifteen tons moved at a snail's pace. Few people can grasp the conception. We know what a man can do, especially when rowing a race, or when raising bricks. Going up a mountain at the rate of 1,000 feet per hour—a fair performance—he does about $\frac{1}{12}$ of a horse's power (H. P.) if he weighs 168 pounds. Working a tread-mill absorbs $\frac{1}{7}$ horse power, which is distinctly hard labor. If he runs upstairs at the rate of 3½ feet per second he does one horse power, and this is not good for his heart. We also know what a horse can do in drawing a cart or moving a canal barge; "550 pounds moved 1 foot per second"—the leisurely pace of a child walking—is more comprehensible than, and the same thing as, 33,000 foot-pounds per minute, and is now more frequently used, especially abroad.

But Watt was not the first to use the term "horse's power." Savery did this in 1702. "An engine," said Savery, "which will raise as much water as two horses, working together at one time in such a work, can do, and for which there must be constantly kept ten or twelve horses for doing the same, then I say such an engine will do the work or labor of ten or twelve horses." Watt, however, gave the unit a scientific character, and was virtually its founder.

He thus introduced the conception of power as the rate of doing work. His unit of work was 1 pound raised 1 foot high, irrespective of the time in which it was done; but by conceiving this being done in a unit of time he conveyed the idea of power.

Again he was anticipated, for Smeaton, in the Philosophical Transactions for 1759, in describing his experimental inquiry concerning the natural powers of water and wind, said: "The raising of a weight relative to the height to which it can be raised in a given time is the most proper measure of power." Watt did, however, introduce the term "duty" to determine the comparative merits of steam engines. It was introduced by him in Cornwall, and is often known as the "Cornish million," for he determined how many pounds could be raised 1 foot high by burning a bushel of coal in his boiler, and found that this could be expressed only in millions.

Watt's bushel was subsequently changed in England to 1 cwt. (112 pounds), and in the United States to 100 pounds. It has now become practically obsolete, for more effective and more uniform means are adopted to express the relative efficiency of engines.

The term "horse power" has probably seen its best days. It is gradually being displaced, and with the advent of the metrical system it will disappear. As a scientific term it has been much abused, and as a commercial term it conveys no meaning. Sir Frederick Bramwell wrote in 1883:

"A barrister lately said to the same writer of this report: 'You surely do not mean to tell me that you do not know what a horse-power is—you that have been a mechanical engineer all your life?' The answer given was: 'Indeed, I do not; there is a difficulty in the outset; what sort of horse power do you mean?' 'Why, I mean a horse-power.' 'I know you do, but there are five kinds of horse-power.' 'Five kinds! impossible; it can't be.' 'But there are; I will give you the names and the nature of them: (1) The real horse-power, the power of a horse, estimated to lift 22,000 pounds 1 foot high per minute. (2) That which in James Watt's time was called the 'nominal horse-power, a horse-power of 33,000 pounds raised 1 foot high per minute, which power he gave all his early engines, so that the purchaser, having one and a half times the power of a good horse, should not be in a position to complain of the engine as inadequate. This term nominal is now commonly confounded with the commercial horse-power, and the name, theoretical horse-power, is substituted to represent that which was received as the scientific horse-power of 33,000 foot-pounds. (3) The gross indicated horse-power. This is the whole power developed on the piston of the engine without any deduction for friction, which power, divided by 33,000, gives the gross indicated horse-power. (4) The net indicated horse-power. This is the same as the foregoing, minus a certain allowance for friction. (5) The commercial, or, as it is now frequeutly called, the nominal horse-power. This is a horse-power about which no two persons can agree.'"

Sir Frederick Bramwell might have added a sixth—viz., electrical horse-power, that which appears in the circuit, or electrical energy.

Is a horse power really a horse's power? Tredgold made it 27,000 foot-pounds per minute for eight hours. Rennie assumed 22,000 as correct. Beardmore had a horse weighing a little over half a ton which did 9000 foot-pounds per minute for hours a day. Morin made it 26,150 foot-pounds. Two horses will tow a canal-boat at 2½ miles an hour, while a steam engine of 10-horse power is needed to do the same work by means of a screw. Tramcars are drawn by two horses at a speed which the so-called 25-horse power motor can scarcely do. The horse is really a more efficient machine for a time than the engine, and its "pull" can be directly applied, but he tires and sickens and dies. He is better adapted to certain kinds of work. He can at times expend much more energy than the so-called horse power. At other times he is helpless and hopeless. Thus it appears clear that a horse power is not a horse's power.

The horse power is based on the units of pounds, feet, and minutes.

Scientific men are now universally using a system of units based on the "centimetre," "gramme," and "second"—hence called the "C.G.S." system, to distinguish it from the "F.P.S.," or British engineers' system.

In this system, the unit of work, viz., one gramme moved through one centimetre against unit force, is called very small, but 10,000,000 of these small units are taken and are called the "joule," and become a practical unit of work. Thus Joule's own mechanical equivalent, the work absorbed in raising the temperature of one pound of water one deg. Fahr. at or about its maximum density, indicated in the "F. P. S." system as 778 foot-pounds, is in the "C. G. S." system the work absorbed in raising the temperature of one gramme of water one deg. Cent., at or about the same maximum density, as 4.2 joules. Thus the joule is to the foot-pound as one to 1.356, and the horse power, instead of being 550 foot-pounds per second, becomes 746 joules per second. The joule per second, or the unit of power, has now been universally called a "Watt;" and thus in the new system the rate of doing work, that is, the power developed by the steam engine, or any other machine, or by any other process, mechanical or physical, is most appropriately indicated in units bearing the name of the Greenock inventor. The term watt was applied in 1883 by the late Sir William Siemens to the joule per second, but I had previously in 1881 at the Paris Congress proposed to apply it to 1,000 joules per second. Siemens' proposal has been preferred, and in consequence the practical unit of power comparable with the horse power becomes the kilowatt. Had my proposal found favor, the practical unit of power would have been the watt, and Siemens' unit would have been a milliwatt. I venture to think the acceptance of my unit would have hastened the departure of the term horse power.

Energy, though so protean in its character, retains its joule throughout all its changes. Every joule impressed on the surface of the ocean by the rays of the sun adds to the moisture of some cloud which, condensed into rain by contact with our cool highlands, feeds a river. The engineer directs this falling water through the blades of a turbine, and each joule that passes assists in rotating dynamos to excite strong electro-magnetic fields and powerful currents of electricity, which in their turn produce light, the intensest heat known, and chemical decomposition.

Thus in every stage of their transformations the joule remains the same mechanical unit, whilst the energy that it measures outproteuses Proteus.

The grand principle of the conservation of energy teaches us that no energy is ever lost. The total energy present assumes a form either useful or useless to man. The skill of the engineer is devoted to render that which is useless useful, and no one has helped him to do this more thoroughly than James Watt.

The watt is universal and exact; the horse power is not. The latter equals in

	Foot-pounds per second.
England	550.00
France	542.47
Germany	582.25

The foot-pound per second equals 1.356 watts. The horse-power, therefore, equals 746 watts. The watt equals 0.7373 foot-pound per second. The kilowatt, 1000 watts, equals 1.34 horse-power.

If, in order to obtain the value of the power, we divide by 33,000 the ordinary formula, $A\ P\ S\ n$ where A is the effective area of the piston in square inches, P the mean pressure of the steam in pounds per square inch during one stroke, S the length of this stroke in feet, and n the number of strokes per minute, we get it in horse-power. If we divide it by 44,238, we get it in kilowatts

Horse-powers multiplied by 0.746 are expressed in kilowatts; and kilowatts multiplied by 1.34 are expressed in horse-power. The new system is universally used by electrical engineers.

Names, when well selected, secure precision of language; a watt is a watt, and nothing else. A pound, on the other hand, may be either a force or a mass of inertia. Names fix ideas. Every electrical workman has a definite and clear conception of an ohm or an ampere. He requires no definition to impress them on his mind. The name alone conveys to him all he wants to know. They become fundamental ideas. There is no ambiguity, hence there is no difficulty either in teaching or in practice. The same benefits would certainly arise if we applied the term kilowatt to the unit of power. No one would have to ask, "What sort of kilowatt do you mean?"

THE diameter of Jupiter is about eighty-five thousand miles, or nearly eleven times that of the earth. Its volume is 1233 times that of the earth; but owing to its being of a less density, its mass or weight is but three hundred times the earth's.

Electrical Progress.

Double Trolleys for Street Cars.

The best electrical engineering talent was at one time divided as to how the current should be rendered available to the moving car, and some of the (now historical) most successful experiments involved the double-trolley system, with over-running trolleys. Under-running trolleys succeeded the over-running, but the difficulty and expense of insulating the positive from the negative wires, because of their necessarily close proximity, and some other causes, led to the abandonment of the double trolley system. The latter has its advantages, however, and these are appreciated in the city of Cincinnati, the only place in the world where the double-trolley overhead system is exclusively used.

The main advantage claimed for the double-trolley system is that it renders the car independent of the track for its motive power. One of the chief disadvantages is that the two sides of the circuit, being necessarily near together, render leakage a factor of greater importance to be dealt with. Mechanically, the system is undesirable, especially in localities where trolley lines cross or intersect each other, or branch.

It is clear that when two single wires cross each other there is but one intersection, but when two pairs of wires cross each other there are four intersections. The difficulty is really less a mechanical one than an electrical one in this case, but, however perfectly the problem may be solved in the future, the relative merits of the systems must ever be the same.

The inducement to return to the double trolley are, among others, that the latter is really cheaper to construct, that it renders the operation of the car practically independent of the condition of the track and that it averts entirely that alarming, but growing and insidious evil, electrolysis.

Great as are the advantages of the double-trolley system over the single (and it possesses some not mentioned here), its disadvantages outweigh them to such an extent that the electric railway fraternity will not make the change, nor the electrical engineering fraternity, recommend it unless this change is made compulsory by law.—N. W. Perry in Cassier's Magazine.

Calibration of Current Meters.

The February issue of the *Oesterr. Monatschrift d. Offentlichen Baudienst* contains an interesting account of the apparatus used by the Austrian Hydrographic Bureau for calibrating current meters of the Woltmann-Mill type, and determining constants for their rating. The tank is nearly 400 feet long and nearly 6 feet deep, entirely closed in a shed. On each side of the canal is a rail, so that a car carried on the rails runs directly over the canal. This car is propelled by electricity, and its speed can be regulated from about 100 feet per minute up to 1,000 feet. On the car is placed the recording apparatus, consisting of a chronograph, a speed-recorder, and a distance-recorder, all making electric records of the various data.

The current meter makes an electric contact for every fifty revolutions, while the chronograph marks seconds, and the distance is recorded for every ten meters; and, as all these appear side by side on the same strip of paper, the relations which the revolutions of the meter bear to the elements of time and distance may be fully investigated.

Refining Bismuth by Electrolysis.

It is reported that a satisfactory method of refining bismuth has been devised by B. Zakorski, who employed impure bismuth as an anode in an electrolytic tank with a solution containing nitric acid as an electrolyte. Carbon, pure bismuth, platinum, or other suitable material, may be employed as the cathode. A current density of 15 amperes per square foot of active bismuth

surface is recommended, and the density must not exceed 30 amperes. Pure bismuth is deposited on the cathodes, from whence it falls, or may be easily removed. It is then washed with dilute HNO_3, dried and fused. When the electrolyte has become too rich in lead, it may be freed from it by electrolysis, or the contained bismuth may be precipitated by metallic lead, and the resulting solution of lead nitrate utilized in any desired way.

Government Telegraph Lines.

A bill has been introduced in the Senate by Senator Kyle to provide for a Government telegraph system within the United States, to be under the government of a board consisting of the Secretary of State, the Secretary of War and the Postmaster General, and shall consist of four trunk lines connecting the northeastern, the northwestern, western and southwestern and the southern part of the United States with the city of Washington, and that these trunk lines shall be connected with lines and offices established at such cities, towns and places as shall be for the public interest for the time being; all to be extended and increased as Congress may from time to time provide money therefor.

This telegraph line shall be carried on and operated as a part of the postal system of the United States, and the rates for the use thereof shall be established by the above-named board.

The bill further provides that there shall be no discrimination in the matter of charges and rates, with the exception of messages for the press, and in that case no publisher of any one newspaper or combination of newspapers shall be allowed better rates than any other.

It is provided that this Government telegraph line shall be constructed and kept in repair under the direction and superintendence of the Secretary of War and through the Corps of Engineers.

AMONG the many modern institutions of Japan, electricity very naturally takes a leading position. The absence of gas works in the country alone will account for the prominence which is bound to be given to this branch of the engineering industry. Here, where earthquakes and other seismic disturbances are so frequent, the impossibility of adopting a general system of gas piping throughout any large town is at once apparent. Then, again, Japan is well off for water power in many of its important centers, with the result that the cost of lighting or traction by electricity is reduced to a minimum.

Mechanical Progress.

A Hydraulic Pumping Engine.

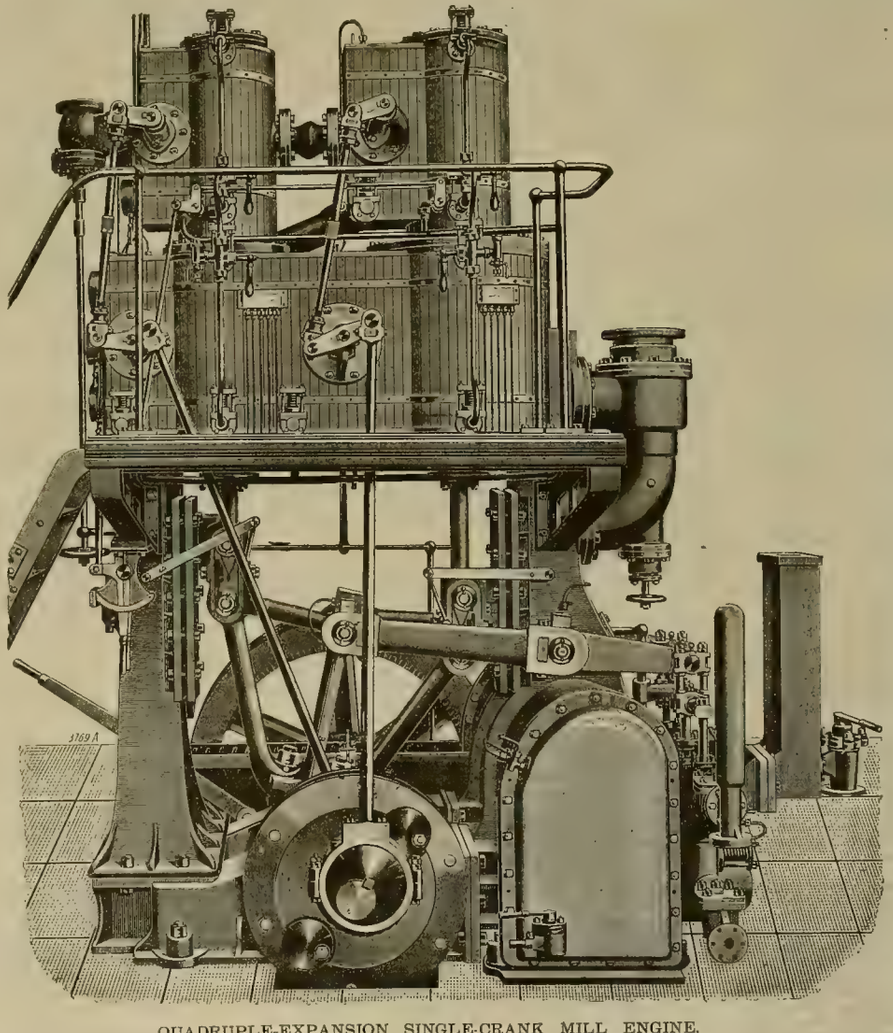
At the Schmidtmannshall salt mine, near Aschersleben, Germany, a water-pressure pumping engine, on Kaselowsky's system, has been erected in the No. IV shaft. The chief difference between this and other engines of the same class is in the high working pressure adopted, so that only a small supply of water is necessary. The pressure of 3,300 lbs. to the square inch is obtained by a steam engine of 200-horse power, working differential pumps at the surface, and is transmitted to the engine underground by a pipe of 1.18 in. bore, having a pneumatic accumulator at either end of the line. In these accumulators the power water lifts a plunger of 6 in. diameter and 4 ft. stroke, against the resistance of a piston of 15 in. diameter moving in a closed cylinder overhead containing air, which is maintained by a compressing pump at 600 lbs. pressure per square inch. The ratio of the two pressures, 5.5 to 1, being nearly inversely proportional to the areas of the piston, 1 to 5.6, the load on each side of the accumulator is under ordinary conditions the same.

The pumping engine is a combination of two pairs of horizontal single-acting plunging pumps arranged duplex fashion, one pair being in the middle, while the other is at the end of the stroke, so as to insure a continuous flow in the rising main. The plungers are tubes of 4 in. inside and 7.33 in. outside diameter, closed at one end, which forms the pump piston, while the other slides through a packed joint on a central tube of 3.38 in. thick and 1.38 in. bore, through which the pressure water is admitted to the interior of the plunger during the driving stroke, the combination being essentially a hydraulic press with fixed ram and moving cylinder. The length of stroke is about 12 in. The plungers in each pair are coupled by side rods, so that the forcing stroke of one works the suction of the other, the pressure water being admitted and exhausted by a piston valve worked by tappets and levers from the connecting rods. A pressure equalizer is placed both on the admission and the discharge sides of the power water, which returns through a pipe somewhat larger than the admission (1.57 in. diameter) to the press pumps at the surface. The water is mixed with grease in order to diminish the frictional resistance. All the joints are packed with cup leathers, which keep tight, notwithstanding the extremely high working pressure.

Quadruple-Expansion Single-Crank Mill Engine.

The engine herewith illustrated was constructed by Fleming and Fergusen, Birmingham. Although it has four cylinders, it has only a single crank. It is of the vertical type, the cylinders being arranged in pairs tandem fashion. The high-pressure and second cylinders are placed respectively over the third and low-pressure cylinders; these cylinders are 9″, 12″, 16″ and 25″ in diameter, the stroke being 21½″. The two crossheads are connected by links to the top end of a steel triangular connecting rod. The valves for the high-pressure and third cylinders are actuated by an eccentric, cut-off being regulated by a sensitive shaft governor. English engine builders claim that this plan is superior to that of having the high-pressure valves alone controlled by the governor, as the early cut-off in the third cylinder checks any tendency to racing which might be caused by the steam already in the engine. A surface condenser was fitted, being cast in one with the back supporting column. The air, circulating and feed pumps are driven from an extension of the radius lever of the triangular connecting rod.

This engine is so designed that when the water supply is short, for condensing purposes, the engine can be converted into a compound high-pressure engine, of almost the same power, on short notice. To do this the valves of the upper cylinders are simply disconnected, leaving the two lower cylinders (16″ and 25″ in diameter) to do the work as compound high-pressure engines, the compressor being shut off through a double valve placed on the exhaust pipe, which opens to the atmosphere at the same time as it shuts to the condenser. It takes but a few minutes to change the engine from surface condensing to compound. On account of simplicity, economy, steady running and small floor space occupied, this type of engine is said to be well adapted for electric power stations. The engine runs at 160 revolutions, at which speed it gives 250 effective H. P.



QUADRUPLE-EXPANSION SINGLE-CRANK MILL ENGINE.

New Style Gallows Frame.

From the Isabella Gold Mining Co., Cripple Creek, Colo., Mr. Francis T. Freeland, the manager and engineer, sends a photograph of a gallows frame on the new main three-compartment Lee shaft, the sixth under steam there, from which the accompanying cut is engraved. It is of Oregon timber 50 and 64 feet long. The main frame (dark in cut), weighing seven tons, was framed on the ground and lifted at once, using one of the back legs temporarily as a gin pole, the other back leg being framed and ready to hoist; main tackle, six-ply 1¼-inch rope; secondary tackle, four-ply 1-inch rope; power, four heavy draft horses; gin-pole guys, old ⅞ wire rope secured to dead men. The arrangement of tackle gave a power of eighty horses on the load. The secondary tackle worked from a snub post. Four rolling hitches were used on the main draft line. It went up in six bites without a hitch.



NEW STYLE GALLOWS FRAME.

The collar is prolonged to the foot of back legs. The sway braces foot on a continuous bolted cross-sill. Every quadrangular panel is cross-braced with diagonal struts or ties. It is double-bolted throughout and the hog-chains have turn buckles. The sheaves are 6 feet 6 inches.

The frame is unusually rigid, has square joints, can be put together on the ground and raised in one piece, can be designed of any required strength and is cheaper than the prevalent styles of high frames.

SELF-PROPELLING fire engines are becoming the fashion. Boston has just added one to her fire-fighting equipment—not the first, by the way, that has been turned out in the United States—and it will probably not be long before other cities will follow suit.

Mining Summary.

CALIFORNIA.

Amador.

Ledger: The old Marklee mine, near Volcano, is soon to be reopened by a San Francisco company. This mine was worked down to a depth of 500 or 600 feet in the seventies, and ore to the value of about $1,000,000 extracted. It is believed that large masses of comparatively rich ore were left in the various levels, as too low grade to prove attractive at that time. A dump of some 10,000 tons is estimated to be worth $2 to $3 per ton, and can be milled at a cost not exceeding 75 cents per ton.

The Gover shaft has been put down to 1200 feet in depth. At this point the work has been devoted to cutting a station and running drifts and crosscuts. The ledge is reported to be very good indeed, in fact, better than heretofore encountered in the mine. The mine is at present being worked on the agreements secured from the lien holders and other creditors two years ago in July.

Butte.

In nine mines at and around Magalia and Forbestown 256 miners are at work—Pershbacker, 65; Princess, 15; Pomerat, 15; Matherson, 5; Bader, 10; Wylie, 12; Dix, 10; Goldbank, 114; Carlisle, 10.

Calaveras.

Prospect: The placer mines in the neighborhood of El Dorado are coming to the front with reports that are very encouraging. It is reported that excellent pay dirt has been found in the gravel operated by Pache & Bush.

The parties operating the Martin placer mine are putting in a water power hoist and machinery, and preparing to work the property on a large scale.

The Bessella mine, being worked by Oakland parties, can be successfully operated at a comparatively small cost. The tunnel by which the channel is at present being worked carries all the water off, requiring no pumping or hoisting. The quantity of gravel is very extensive and the prospects are better than they have ever been before.

Citizen: The Bald Hill mine at Albany Flat, owned by Fred Brunner of Angels, has been bonded for $3500.

The Rose Hill mines, near El Dorado, have been sold to Edward Hirschler of San Francisco for $5000. This group comprises about seventy acres, and includes a quartz vein that has been developed to some extent, and rich deposits of gravel. The purchaser will begin work on the gravel immediately. Water will be conveyed from Table mountain, which will necessitate the use of about 12,000 feet of pipe.

Chronicle: The Vair tunnel being run by the California Exploration Company has now reached a length of 600 feet. The air compressor and Burleigh drills were started up last week. Power is obtained from the Mokelumne and Campo Seco canal.

On the Bund mine sinking on the footwall is going on, the shaft having reached a depth of 240 feet. The vein at the bottom shows a width of 25 feet. Considerable water has been encountered.

The Sparrow Hawk and Calaveras Queen mines, on Esperanza creek, are showing up well as development work progresses. The mines have been bonded to a San Francisco company through Charles Pieffer and Frank H. Hall. A tunnel 225 feet in length has been run on the lead in the Sparrow Hawk and the pay chute has just been struck. There has also been two shafts sunk, one 65 and the other 25 feet in depth. It is the intention of the company to run a tunnel in from Esperanza creek, some 600 feet in length.

The same gentlemen have also bonded the Werle ranch mine to a San Francisco company, and work has been commenced on the property.

El Dorado.

(Special Correspondence).—The tunnel in the Lloyd property has gone beyond 225 feet and is cutting through a formation that shows encouraging prospects.

The drift north in the Empress Josephine property has passed the 45-foot mark and is in a good grade of ore.

The shaft on the Marguerite is down 50 feet on a 13-foot ledge of satisfactory ore.

Work is progressing rapidly on the Smith property and the developments are gratifying to the prospectors. This is in close proximity to the Lloyd, Empress Josephine and Gentle Annie properties.

At the Union property the tunnel is approaching the ntended limit of 500 feet.

At the Larkin mine C. H. Dunton is drifting for the east ledge on the 100 level. D. H. Jackson, the former superintendent and a large owner of stock, resigned because the company concluded to erect a mill when they had reached but 250 feet depth, and the shaft, he thought, should be driven 500 or 600 feet before talking of a mill.

In a mother lode section where miners of many years' experience are superseded by graduates of ninety-day observation studies, and whose deep mining does not go beyond their superficial experience, there are several illustrations within a small radius of Placerville. Yet people wonder why the much-vaunted mother lode is less productive in one county than in another, losing sight of comparisons in which experience, the best of skillful mining, and great depth are very important factors. In the outcome the county is damned and the San Francisco merchants throw up their hands in anguish, thinking they have been duped by designing people and inveigled into unproductive schemes of no merit, despite the fact that the mineral surveyor's lines have been stubbornly ignored. Men who know nothing of mining and are unwilling to trust to experienced men, and reluctant to dig deep into the earth, do themselves and localities better service by refusing to venture into unknown fields under the guidance of inexperienced and self-opinionated ninety-day graduates in the mining field.

Placerville, April 26th, '97.

Nevada.

A 10-stamp quartz mill has been ordered for the Kirkham mine at Nevada City, California.

Herald: The Spanish mine, near Washington, has resumed work and the mill is kept constantly running. This mine is worked principally from the surface in open cuts. Shafts are raised from the main tunnel, which is on a level with the top of the ore dump at the mill, and the ore, being stoped out by the use of churn drills, is run down these shafts, where it is received by a train of cars and carried to the mill. The loaded cars are run by gravity and a mule is used to draw back the empty train. From 130 to 140 tons of ore are run through the mill daily. Long strings of plates and sluices are used in saving the gold. Eight white men and six Chinamen is about all the labor employed to run both mine and mill.

Placer.

Sentinel: Extensive development work is in progress at the Black Oak mine, near Weimar. E. W. Chapman has taken charge and will thoroughly prospect the property. A shaft will be sunk near the lower tunnel to a depth of 200 feet. From this shaft the ledge will be crosscut and drifts will be run. A compressor will be put in to furnish power for running machine drills, and three shifts will engage in the work of sinking. Mr. Chapman has let a contract to extend the tunnel south 200 feet on the ledge.

The May Flower Mining Company at Forest Hill have commenced to build a flume to convey the water which they will use for hydraulicking next winter. At their drift mine the company is engaged running a bedrock tunnel to strike the channel in the Orono tunnel, 2500 feet east of the May Flower channel.

The big tunnel of the Eureka Consolidated Drift Mining Company, above Forest Hill, is now in 2010 feet. The rock at present is very soft and the outlook is very encouraging.

The lumber for the new 5-stamp mill and boarding house for the Belle Union mine has arrived at Weimar.

At the Retta quartz mine in the Westville district a shaft will be sunk on the ledge this season.

Sprague & Neal will open the old Blake quartz mine, near Succor Flat, this spring. They will run a tunnel in on the ledge.

Plumas.

Independent: The Thistle Shaft force has been lowering the water at the rate of about 15 inches in twelve hours.

It is expected that the water in the large Feather river ditch will be through in a few days, when the three large monitors in the Upper Dutch will be running. At present only one monitor is in use.

At Johnsville a contract has been let to drive 100 feet of tunnel at the Four Hills mine.

Shasta.

Searchlight: The Milkmaid mine, north of French Gulch, is working as many men as possible so as to open up ground enough to supply ore to keep the new mill running. It is the intention to put thirty miners at work as soon as working room for them can be opened up.

The Niagara mine at French Gulch has closed down temporarily. The company is undergoing a reorganization.

Free Press: Active operations will soon be resumed at the smelter at the old Afterthought mill, on North Cow creek. Late last fall a smelter of twenty-five tons capacity per day was erected, but owing to lateness in the season operations were abandoned. The development work at the mine continued. They have a 6-foot ledge of rich base ore carrying over 20 per cent in copper, together with good values in both gold and silver. The presence of much zinc in the ore makes it difficult to reduce.

A rich strike was recently made in the Delta mine on Dog creek, near Delta, owned by M. D. Butler and son, but now under bond to the Delta Mining Company of San Francisco. The company has been developing the property for some time past. There is a tunnel 300 feet in length upon the property. They began at a distance of 250 feet from the mouth of the tunnel to sink a shaft. At a depth of 40 feet they struck a fine body of ore which is very rich in sulphurets and galena.

The Crown Point Gold Mining Company are hauling ore from their mine on Muletown mountain to this city and shipping it by rail to the smelter at Keswick. Five carloads have already been shipped.

Siskiyou.

News: The McConnell & Quinn mine at the mouth of Humbug is being fitted up for the summer's work. This mine is operated by Chinamen on the percentage system.

The Pennsylvania placer mine, on the lower Klamath, has made the second cleanup of 100 ounces. This is one of the best equipped mines on the river.

A Portland company, representing large capital, are examining the placer mines of Oro Fino, with a view of making an offer for them.

The Classic Hill mine, on Indian creek, is being fitted up for the season's run. This mine is owned by Matthews and Vogan.

Dave and John Drake have recently made a rich strike at the head of Collins creek, in Oak Bar district.

I. N. Day, president of the Klamath Flume and Milling Company, is expected at Happy Camp to decide on the survey that will be adopted for their big ditch.

Journal: The B. Reider mine, on Shasta river, will probably be sold to a Boston company. Negotiations have been under way for some time.

The Bunker Hill mine, near Happy Camp, is in active operation, and the owners expect to do better than ever with the mine this season.

The high water in the Klamath at Ash creek troubled the miners very seriously, causing considerable damage and expense. The American Bar Company was obliged, from the great pressure on their wingdam, to fill the pit. This company works between forty and forty-five men, who have been laid off until the river goes down and the pit is pumped out.

The Mabel mine, on the divide between Oak Bar and Scott Bar, owned by Timmons & Chamberlain, will no doubt soon be sold to a company of San Francisco capitalists, and will then be worked on an extensive scale.

Journal: The Klamath River Flume and Mining Company intend carrying the water from the North Fork of Indian creek to their mine six miles above Happy Camp, a distance of fifteen miles. At the crossing of Ambrose creek, a siphon will be put in with a drop of 400 feet. They have a large tract of mining ground in the vicinity, which they have been prospecting for some time past.

The old Lost Chance mine, at Callahans Ranch, is being worked at present with quite a force of men.

Trinity.

Journal: At Deadwood the Brown Bear Company are working a larger force than for a year past and recently discovered a large body of ore in the old Last Chance drifts.

Gazear & Clements have struck a rich ledge on the Enterprise claim—small but rich.

The Blagrave brothers have struck a ledge on Donnelly gulch, supposed to be an extension of the Little Gem. They are running a tunnel to tap the ore body.

Cochran, Brady & Tourtellotte are working on the Lappin mine with good results.

Tuolumne.

The Tarantula mine, recently purchased by an English syndicate for the sum of $20,000, is turning out well. A 200-foot shaft is being sunk and a suitable hoist erected.

The Junction mine, under process of development under the management of W. H. Storms, is making a very encouraging showing. A vein varying in width from 14 to 30 inches assays well.

Independent: South of the Tuolumne river, on the Grant mine, owned by a San Francisco company, there is a shaft 225 feet, from which they have taken considerable money. At the present they are preparing to put up machinery to sink 1000 feet.

The North Star and Black Warrior, owned by D. R. Oliver of Stockton, is an old property that was worked years ago, but has been lying idle for want of capital to develop it until Mr. Oliver invested. At present he has a force of men employed, working three shifts, running a tunnel which is in about 220 feet.

Union-Democrat: At the Soulsby drifting and crosscutting is being done in the new shaft on the 200 level, while a crew of men are still engaged in sinking.

At the Black Oak the shaft is nearing the 900 level. The vein holds a uniform depth of 14 feet. Large quantities of ore are being shipped every day to the Selby Smelting Works.

At the Dead Horse quartz is being sent up from the 1500, that is as good as the mine ever took out. The shaft is still being driven down and sinking will continue until a depth has been attained of 1700 feet. The vein is large, and there is plenty of good ore in sight.

The ore body in the Lady Washington has enlarged, and a big output is shortly expected.

Drifting and crosscutting has been commenced on the 500 of the Rappahannock, and a full force will be put on sometime in the near future.

Supt. McDonald is working the Confidence full-handed, and beside the general underground workings is having systematic prospecting done for surface chutes.

The mill of the Belleview is still hung up, while the shaft is being run down another 200 feet. It has already neared the 900 level, with a rich body of ore in sight right along.

Driving ahead in the 1200-foot breast of the Kelz tunnel exposes better rock every shift. Other portions of the mine are being worked beside, and the 15-stamp mill is kept running.

Democratic-Banner: The first payment of $2000 on the Plummer gravel mine, above Columbia, has been made by T. C. Cox to the Plummer Bros. The area in gravel is large and prospects well. A ditch from the Stanislaus river, with a capacity of 1000 miner's inches, will be built.

NEVADA.

White Pine *News*: Freight teams keep rolling in from the railroad with material for the Star and Gray Eagle mines.

The new management of the Cainman mine are to run their works at the mine by electrical power, the waters of Murray creek to be used in generating the electricity. Work on the ditch has begun.

Dayton *Times*: Some time during the summer ore from the Logan & Hully mine, and also from the Mayday mine, in Como, will be treated by the patent pulverizing and concentrating process of C. V. Peck's at the Douglass mill. The ore from the Logan & Hully mine assays anywhere from $10 to $50 per ton. Some of it has been worked by different processes, but the full value has never been extracted.

Eureka *Sentinel*: This district has been famed for years as a great lead-smelting center, and the impression has gone abroad that only silver was found in the ores smelted. Now, as a fact, one-third or more of the precious metal produced has been gold, many of the mines producing gold almost exclusively. Hundreds of thousands of tons of ore have been worked in the district assaying $20 and upwards a ton in gold, a great deal of it running far above that figure. At the present time large quantities of ore are being taken out of our mines and sent abroad and sold, coming quite up to these figures in gold.

In White Pine county at Hamilton a great deal of ore is being taken out for shipment this summer.

Pioche *Record*: The Chainman group of mines at Ely are now in possession of the new owners, Lane and others of San Francisco, and active work has been entered upon. The waters of Murray creek will be utilized to generate electrical power for use of both hoist and mill at the mines. The ditch for this purpose is under construction.

LINCOLN COUNTY.

The report for the quarter year ending December 31, 1896, by the DeLamar Company, the last report made, shows that 20,677 tons of ore were worked through the mill, the gross yield being $575,462. From this there was deducted $77,435 as the cost of extracting; $22,436 for transportation, and $372,186 as the cost of milling, leaving a net product for the three months of $103,403.

OREGON.

Rogue River *Courier*: Thirty men are at work on the Pickett Creek Mining Company's placers. Most of them are engaged in digging the new five-mile ditch. Piping has been suspended for the season.

A prospector picked up a $140-nugget at the head of Jump-off-Joe last week. It was shaped like a piece of strap 4 inches long and rather thin.

The Alexander-Bent placers are running on full time on Galice creek. Two monitors are busy tearing down banks from 30 to 90 feet high.

The contract for running the 500-foot tunnel on the new Lewis acqueduct has been let to J. W. Ray for $2.25 a foot. A twelve-mile ditch will be dug this fall, after the clean-up. This ditch will connect the upper Grave creek placers with the Lewis diggings near Leland.

An old channel, rich in gold, crosses the Siskiyous at the head of the Althouse, near the California line, and has been traced across the Illinois valley in a northwest course, thence across Rogue river below the Sherer placers and thence into Douglas county, striking the rich diggings of Cow creek. In early days to strike this channel meant pounds, not ounces, of nuggets, but it takes digging and piping to uncover them now, although the old channel is exceedingly rich wherever dug into. Modern methods will make it yield more gold than ever in the near future.

Grant's Pass *Observer*: At the Lewis placer mine on Grave creek two 5-inch giants are in place, working alternately. Sixteen men are employed in and about the mine.

A large vein of ore has been cut through in the Free and Easy mine at Kerby at a 150-foot depth.

The old Hole-in-the-Ground property is being opened up by the A. J. Richison Mining Company, which has purchased the Hold Out claim and is getting the mine in shape for work.

Medford *Mail*: Work will soon be commenced on the mining ditch from the Saxe Creek falls to N. D. Young's placer mine, where a hydraulic plant is to be put in.

Work will soon begin on the Bart-Signoretti mine, owned by Purder & Stanfield, near Murphy gulch. A 200-foot working tunnel is to be run to tap the vein at a depth of 150 feet below the old shaft.

It is reported that the parties interested in the proposed big mining ditch from Evans creek to Loose creek are soon to let out the contracts for the building of it. The length of the ditch will be about forty-five miles and will have a capacity of 1500 inches of water.

WASHINGTON.

Importations of lead ore at Northport amount to 300,000 pounds a day. The duty collected is over $40,000 a month.

In the Lakeview Mining Company's property the ore is chloride and sulphate, bromide and quartz and chloride, carrying silver and some gold. The formation is a slate roof and porphyry foot wall, and the ore ledges are from 2 to 8 feet. There is on the Lakeview a 175-foot tunnel, with a 25-foot crosscut tunnel, a 140-foot incline tunnel and crosscut.

On the Whitecap mine, owned by Poorman & Hays, on Red Top mountain, there are two ledges. On one is an open cut 30 feet long and 10 feet deep, with a 5-foot ledge. The ore is siliceous, carrying gold, silver and copper.

The Anaconda mine, owned by the British Canadian Gold Fields Company, and the Detroit, owned by W. H. Kearney & Co. of Spokane, are adjoining properties to the Washington, and the ore characteristics the same. Development work is being pushed on the Anaconda under the direction of Superintendent McDonald. The tunnel now being driven is in 220 feet, and it is expected to crosscut the ledge within the next 10 feet and at a depth of 175 feet.

The Bald Eagle mines comprise a group of six claims, owned by Aug. Heinze—owner of the Trail smelter — and are on Chloride mountain. A 600-foot working tunnel has just been laid out to tap the ledge 300 feet below the surface.

Spokesman-Review: F. K. McBroom has ten men at work on the Big Iron mine, on the reservation. Over $4400 was spent on this property after last August. The claim is remarkable for its strong iron capping.

The Little Giant mine has been developed beyond the experimental stage, and improved machinery will be put in with which to break and hoist the ore in an 8-foot vein at the bottom of a 75-foot shaft.

ALASKA.

News: Cooks inlet received a black eye last season. The summer before reports were brought out by men who were considered trustworthy and competent that the Cooks inlet section was second only to the great Yukon. Many inexperienced men went in last summer and failing reported the country

worthless. A few, however, had faith in the discoveries. About a year ago the Excelsior Company chartered the steamer Excelsior from San Francisco to make a special trip to the inlet, and sent her off loaded to the guards with lumber, steel pipe, hydraulics, supplies and men. The cargo was discharged on the beach at Anchor point and all summer long improvements were made and developments prosecuted. Those comprising the company are Boston capitalists. The company was formerly known as the Boston-Alaska Mining Company, though now is spoken of as the Anchor Point Company, with R. A. Lane general manager. Their holdings consist of several hundred acres of placer ground at Anchor point and also a number of claims at the mouth of the Shuitna river near Tyoonock. The former is the scene of their developments at present. Last season ten giants were brought up and that number has been this season augmented by ten more. To furnish the quantity of water to operate these giants the company has constructed a dam across a ravine in the mountains, creating a reservoir. This was built last summer. Two miles of the ditch were dug last season, its dimensions being 3 feet deep, 4 feet on the bottom and 9 feet on the top. The contract on the remaining five miles yet to be dug has been let, and a force of eighty men went to the inlet two weeks ago on the Bertha, chartered for the trip. Two sizes of nozzles are used, according to the stage of water in the reservoir—one of 3 and one of 4 inches diameter. The claims owned by the company have a frontage on the beach of over two miles, the gravel averaging about 10 feet in thickness. But little stripping is necessary and but few large rocks or boulders have so far been encountered to harrass the work of the giants.

BRITISH COLUMBIA.

The following are returns of the ore production up to April 17, and they show that the yield is at the rate of nearly nine million for the whole year:

ORE EXPORTED

	Tons.
From Slocan via Kaslo	9,128¾
From Slocan via Nakusp	2,642¼
From Rossland via Northport	6,088½
From Rossland via Nelson	52
	17,911¾

Total value:	
Through Nelson custom house	$1 039,082.28
Through Revelstoke (Nakusp)	292,110.65
	$1,331,192.93

Average value per ton, $74.3195.

PRODUCE OF SMELTERS.
(Shipped)

	Tons.
Nelson (Hall mines) matte	561¾
Trail smelter matte	2,279¼
	2,840¾
Total value	$1,227,869.67
Total value of ore and matte expt'd	2,550,062.60

Ore shipments from Rossland during the week ending Saturday, April 17, were: Le Roi, 900 tons; War Eagle, 200; Iron Mask, 75; O. K., 32; total, 1,207. The O. K. mill treated 112 tons. These shipments bring the amount for the year to 17,103 tons, of which the Le Roi has contributed 12,012 tons; the War Eagle, 3,191, Columbia and Kootenay, 458, Iron Mask, 938; Jumbo, 91; Josie, 126; Cliff, 61; Red Mountain, 56; O. K., concentrates, 118; Evening Star, 21; Giant, 21; I. X. L., 12.

Kootenain: In Ainsworth district is announced the discovery, last week, of a fine body of ore on the east side of the lake, and one and one-half miles northeast of Blue Belle mine. It is a 6-foot ledge of galena ore, assaying forty-three ounces of silver and 50 per cent lead per ton.

There is reported the sale of the Twin claim to A. W. Morris, of Montreal, by McArthur and Strobeck for $35,000; $3,000 cash.

T. M. Gibson has purchased for his company the Mamie for $3,500 cash, from the Britania Mining Co., and the Lady of the Lake and Hamburg from O. Berg and Dan Clark for $8,000 cash. This company nows own a string of fine claims, and will put up machinery for the active operation of the Little Donald, as soon as the roads are in a condition to be used.

Spokesman-Review: Henry Croft of Victoria has closed for the Black Fox, Daisy and California, on the South Fork, for $30,000. The new owner will at once begin the construction of a concentrator.

A short time ago the Blue Jay claim near Vernon was bonded to a London company for $10,000, on which the owner, H. Latimer, has received the first payment of $2500, the balance to follow in six months. Work will be pushed ahead on this claim.

The Ruby Gold Mining Company received an offer from New York of $25,000 for four-fifths of the property. The offer has been accepted, providing the purchasers guarantee to do a certain amount of work upon the property every year.

A concentrator of 150 tons cepacity has been ordered for the Galena Farm, a Slocan property owned by a strong English syndicate. The mill will be in operation in the course of three months.

Fort Steele *Prospector*: The North Star mine produced and shipped during the year 1896 nearly 4500 tons of ore, which had a valuation of $225,000. At the present time the company has 3,000 tons of rich carbonates and galena at their landing on the Kootenay river and 3,000 more on the dump—6,000 tons that will average $60 per ton, or a gross valuation of $360,000.

There is no doubt that at least 200 mines in this district will become producers upon the advent of the Crow's Nest railway.

UTAH.

Salt Lake *Tribune*: In the syenite-dolomite contact, between Frisco and Copper gulch, and not more than three miles from the post-office, a lead, said to be 20 feet wide, has been struck, from which splendid samples of lead-silver ore have been taken.

An offer has been made to the owners of the Martha and Kate Sackett claims in Beaver Lake district, and if accepted, the purchasers will put up a small hoisting plant and prosecute development.

The Horn Silver is employing about 160 men. The mill is running steadily, and shipments of ore continue regularly.

At Price W. H. Culmer, superintendent of the gilsonite company, owning the Pariett mines, expects to put more men at work soon and renew shipments of gilsonite.

Mammoth *Record*: The contract for sinking another 100 feet in the Emerald shaft has been awarded. The shaft is now down 534 feet, and will continue to the 700 level, when a drift will be run to the vein.

The shaft which is being sunk 350 feet from the mouth of the Lower Mammoth tunnel, is now down 100 feet, and will be pushed down another 100 feet.

Work is to be resumed next week at the Sunbeam, and the shaft will be pushed on down.

Tintic *Miner*: Shipments from the district for the week are as follows: From the Bullion-Beck mine, 15 carloads of ore; Centennial-Eureka, 7 carloads concentrates; Swansea, 4 carloads ore; South Swansea, 5 carloads ore; North Star, 1 carload ore; Dragon iron mine, 3 carloads ore daily.

The newly incorporated Murray Hill company will commence sinking on their property in a few days. The property of the company consists of the Murray Hill, Sego Lily and Silver Dick claims, lying just east of the Rabbit Foot.

Arrangements are nearly completed for the commencement of operations on the Peru, and that work will surely begin about May 1st.

Secretary Cobb of the Triumph Milling Company advises us that the force at the mine has been increased, and that the development hereafter will be pushed faster than ever.

The Homestake people are taking out considerable good ore. They have also commenced sinking the shaft from the 300-foot level, and will carry it down to the 500.

Mercur *Mercury*: Enough ore is taken from drifts to run the Sacramento mill, and consequently stoping in other parts of the property has been discontinued.

Between thirty-five and forty tons of ore are hoisted daily at the Mattie mine. The workings are fast reaching forward, and are nearing the old Nimrod workings, but at a much lower depth.

At the Mollie Gibson, work on which is being pushed by Mr. Craft and associates, a drift has been run in a northerly direction from the bottom of the shaft, a distance of 45 feet, on a fine body of ore. A south drift will be run soon.

The Great Eastern Mining and Milling Company has let a contract to drive their incline tunnel, which is in 90 feet now, another 65 feet, and think to strike pay ore before the contract is finished.

Owing to the burning out of the shaft on the Searchlight, in the Sunshine end of the district, mining work on the property was discontinued; but now that the shaft has been retimbered, active development work has again been resumed.

Bingham *Bulletin*: Lively work has been done at the Winnamuck mine this week to prevent its flooding; but in spite of all efforts, it may fill to the 200 level. The occurrence is especially inopportune, as we understand parties are now en route from the East to inspect the Winnamuck and other Utah properties.

At the Phœnix and Coramandel sinking and raising are in progress to connect the tunnel level with the level 325 feet above for air and production. The work will be completed within six weeks, when the mines will be in condition to output 200 tons of ore per month.

R. H. Carr and Charles Jacobs have begun work on the No. 10 and '92, adjoining the Chicago, on which they have a bond and lease from the Heaston Bros.

Work on the Bingham tunnel will soon be actively resumed, with plenty of funds to complete it.

Eureka *Democrat*: It is the intention of the Orient Mining Company to start development work on the Golden Hope claim, the most promising ground in their group, soon after the 1st of May.

The Grand Central is still pushing ahead, and an excavation is now being made for a donkey engine, which is to be placed in the workings.

Some good-looking rock has been uncovered at the bottom of the Gen. Logan shaft, and the indications are favorable for a good strike in that property.

Arrangements are being perfected for the incorporation of the Lucky Boy group of mines, which are located near Silver City.

Silver City *Star*: The Treasure Leasing Company has let a contract for sinking the shaft on the Cornucopia 115 feet deeper. The shaft is now down 285 feet, and when this contract is completed the 400-foot station will be cut. A station will also be cut on the 300 level and a station pump put in to handle the flow of water which it is expected will be encountered.

M. D. Howlett of Eureka recently purchased a one-fourth interest in the Lucky Boy claim from H. F. Lockerby, and arrangements are now being made to incorporate the property.

IDAHO.

The Union Silver Star Company of Blacktail mountain will resume operations in a few days with a large force of men.

The American Developing and Mining Company is soon to put a force of men at work on the Bull of the Woods group of mines southwest of Gibbonsville. This property is famous for its mountains of low-grade ore, and it is among the probabilities that a reduction plant commensurate with the amount of ore in sight will be erected on it during the coming summer. Mr. MacDonald, the manager says that the American Developing and Mining Company is now in shape to adopt a more aggressive policy in every branch of its business than it has done in the past, and that it is not improbable that a stamp mill would be erected on the Bull of the Woods during the season.

In the Elk City country, on the Bitter Root divide, in 1895 a Chicago company put in a hydraulic elevator plant on American Hill, and last year they are reported to have taken out $1,000 in gold per day. A Butte company purchased last fall the Buffalo Hill placer property and have kept a large force of men at work all winter putting in a bedrock flume. They used 100,000 feet of lumber in its construction and have hauled in over the thirty tons of iron pipe and hydraulic equipment. The Ternan Hill property was also purchased by Butte parties a few months ago and with characteristic enterprise are going ahead to open up the ground and equip it with up-to-date improvements. The Moose creek placers have also passed into the hands of Eastern people and last fall they prospected for and found an old channel carrying the coarsest gold ever found in the Bitter Root country.

Silver City *Avalanche*: On the Morning Star a level has been started from the shaft during the past week, and will be known as the No. 5. The miners are working in good ore at that point.

At the Trade Dollar three eight-hour shifts are at work at the new shaft in the Blaine tunnel. The hoist is now enroute from the East and will soon be in place. The mill is running at full capacity, with regular bullion and concentrate shipments.

MONTANA.

Inter-Mountain: The Hope mine at Basin will be started under the superintendence of Arthur Bird. He is confident that within thirty days he can make the property pay a $10,000 dividend from the proceeds of a big body of ore which was uncovered just before the shut down. The proceeds are to be first applied to the payment of cost of mining and milling, and the balance to be applied to the payment of outstanding time checks amounting in all to about $5,000.

The Gold Coin mill is shut down for the present on account of new machinery being placed in position. The mine is working with a full force. Two shafts are being developed. One is down to a point where if the lead is struck again the company will have 200 feet of ore in sight. During the week General Manager L. U. Loomis and Superintendent W. T. Morgan bonded a group of six claims in the Royal district, for $40,000, and paid $5,000 down.

W. R. Moore, a barrister of Rossland, B. C., has secured a bond from G. W. Collins and J. T. White upon the Iron Clad mine in Lost Creek district. The bond runs for five months and calls for the total payment of $17,000.

Butte *Miner*: John W. Forbis, as receiver for the Butte & Boston properties, has paid out $56,000, or a 35 per cent dividend on debts of the old company, which amounted to less than $200,000.

In the Clipper mine at Pony a strike was made in No. 4 tunnel. At a depth of 1200 feet a large body of high-grade ore was struck, running from $80 to $180, on what is known as the Belle ground. The length of the tunnel is 1700 feet. This find has demonstrated the fact that what is needed in the Pony district is depth.

The Anaconda Company is moving the machinery from the Matte mine to the Orphan Girl, near Big Butte, where a shaft 1000 feet deep will be sunk on this silver property. It is reported that the company will develop several of the silver properties in this vicinity, as the ore carries silica, which is needed for fluxing purposes in reducing the copper ore from some of the big mines of the company.

NEW MEXICO.

Silver City *Enterprise*: D. B. Gillette, representing himself and others, has made one of the biggest purchases of mining property recorded for many years in the Territory. The property is the Pacific group of gold mines at Pinos Altos, nine miles from Silver City. The mines owned by Bell & Stevens, of Pinos Altos, included in the sale, are the Pacific Extension and Pacific No. 2 on the Pacific vein, the Grey Horse and Tip Top, parallel and adjacent to the Pacific claims on the west, the Ohio mine on the Mountain Key vein, the Mina Grande, Mogul and Kept Woman, on the Mina Grande vein; the Silver Rule, parallel and adjoining the Kept Woman on the west; the Little Chief and Annie mines, adjoining the Treasure Mining Company's property, on the Atlantic vein; the Mackinaw mill and mill site, in the town of Pinos Altos, and the Raymond mill and mill site, formerly known as the Smith & Ailman property.

In addition to the properties of Bell & Stevens, there is included in the deal the valuable mining properties of the Pacific Gold Company of St. Louis, at Pinos Altos, and the company's 20-stamp mill at Silver City. The amount paid for the properties is said to be $250,000, spot cash. The new owners have already taken possession of the property. It is expected that the new company will build a pipe line to bring water from the big springs on the ranches which they have purchased to the mines, and that a large reduction plant will be built at the mines. D. B. Gillette will take charge of the property as general superintendent.

At Pinos Altos the Treasure Mining Company has the usual complement of fifty men at work in the mine and mill.

At Santa Rita there are twenty men employed on the Driscoll lease assorting the old dumps.

J. B. Gilchrist has sixteen men at work upon his leased ground on the Guadaloupe, Chino, Oxide and Yosemite mines.

L. R. Munson has leased and bonded his copper mine, situated half a mile from Santa Rita, to N. S. Berray; consideration, $10,000.

Wm. Kieff is working seventy-eight men on the Othello and Desdemona claims. His shipments average over fifty tons per day. The shipments for March were seventy-eight cars of twenty tons each. The ore is a lead carbonate, running about 60 per cent lead and 10 to 15 ounces silver per ton.

ARIZONA.

Republican: The Black Warrior Copper Company has bonded the Gray Eagle, Blue Eagle and Black Eagle mining claims, from Sultan & Sidow. These claims are located ten miles north of Globe and two miles from Richmond Basin. The claims show an immense ledge of iron ore, which carries enough copper to pay transportation and smelting charges, together with some lime, and is almost free of silica. Contracts will be let immediately for the development of the claims.

The North American Exploration Company, who have a bond on the Continental copper mines, are greatly encouraged by the developments made, and Mr. Amster is instructed to push the work as rapidly as possible.

The reported strike of copper in Coconino county has caused something like a boom. Two hundred men have been working all winter, and results have been most encouraging. It is claimed that this is the only point in Arizona where self-smelting ores are found—the only place in the Territory where there may be immense deposits of lead and copper oxides to make possible local reduction works. Ninety-five per cent of the ores of Arizona are dry ores, which can not be worked alone. They have to be concentrated. The result is that from 15,000 to 20,000 tons of Arizona ore are shipped annually.

The Gopher mine, Big Bug district, has been sold by Mrs. Fanny Kautz to the Gopher Gold Mining Company; consideration named in deed, $196,750.

Final payment has been made on the Ophir mine, which is an extension of the Congress, E. B. Gage, representing the Congress Mining Company, being the purchaser, and E. Gillespie, R. H. Burmister, Len Hale, F. G. Parker and W. C. Bashford, the sellers; consideration, $30,000.

In Black Rock district, on the Hassayampa, Murphy & Hutchinson are working the Gold Bug mine with excellent results, taking out good shipping ore. The ledge is 3 feet wide.

Parties have taken a lease on Powell's Dark Horse and Right Bower claims—silver properties—and are taking out ore from them. The vein is 7 feet wide.

A large force of men is at work on the Texas Chief and Texas Prince, on which there is a tunnel 100 feet long. The ledge is from 2 to 3 feet wide and the ore carries gold and about 33 per cent in copper.

COLORADO.

Denver *Republican*: These figures show the production of Cripple Creek mines so far this year, estimating the remainder of the present month at the rate the ore is now coming out:

Month.	Tons.	Average.	Value.
January	18,000	$48	$ 864,000
February	18,500	48	886,000
March	23,500	45	1,057,500
April	17,500	60	1,050,000
			$3,877,500

During the same period of 1896 the yield was:

January	$ 460,000
February	508,280
March	534,000
April	435,000
Total	$1,937,280

Actual figures on the production are at all times hard to get. These are those conservative business men with millions at stake in camp have compiled for their own information and guidance. In every previous year in the history of Cripple Creek the first four months have been the worst of the twelve. The second four have always shown a decided gain in output, and the last four—September, October, November and December—have never failed to turn out more ore than the total of the eight preceding.

The Legal Tender, on Bull hill, is producing an average of sixty tons of ore per day, about one-third of which is smelting rock of an average grade of four ounces. The milling ore is worth from $15 to $30 a ton.

At Pine Creek a new plant of machinery will at an early date be put upon the Golden Scepter property, operated by Omaha and Denver parties.

The Elk Park Mining and Milling Company has a force of men working on the two shifts in the Annie H. property. Sinking is being carried on in the shaft at a present depth of nearly 135 feet, with a 2¼-foot vein of yellow and gray copper.

At the Jessie Bartlett Davis property, on the northwest slope of Colorado hill, a tunnel is being run to cut the shaft, which is now in 135 feet, and another contract has been let to drive it 80 feet farther. The crevice matter of late shows considerable copper iron coming in.

A Chicago expert has been examining the Plateau mine, which has its shaft down 350 feet, and it is reported that the owners will sink it another 350 feet.

Word comes from Idaho Springs that a big strike has just been made in the Wilcox tunnel, operated by Rev. Wilcox of Denver, a blind lead measuring 3 feet wide, with values running from $30 to $150 per ton, being cut in the breast at about 1200 feet from the surface end.

At Breckenridge among the new projects for this season's operations are an electric power and ore railway company, a sampling works, a local custom gold mill, a 30-ton capacity cyanide mill for the Carrie group, a "quick drop" stamp mill for the Golden Eagle, a new 10-stamp battery for the Hamilton Company, a mill, and the installation of several river plant placer machines.

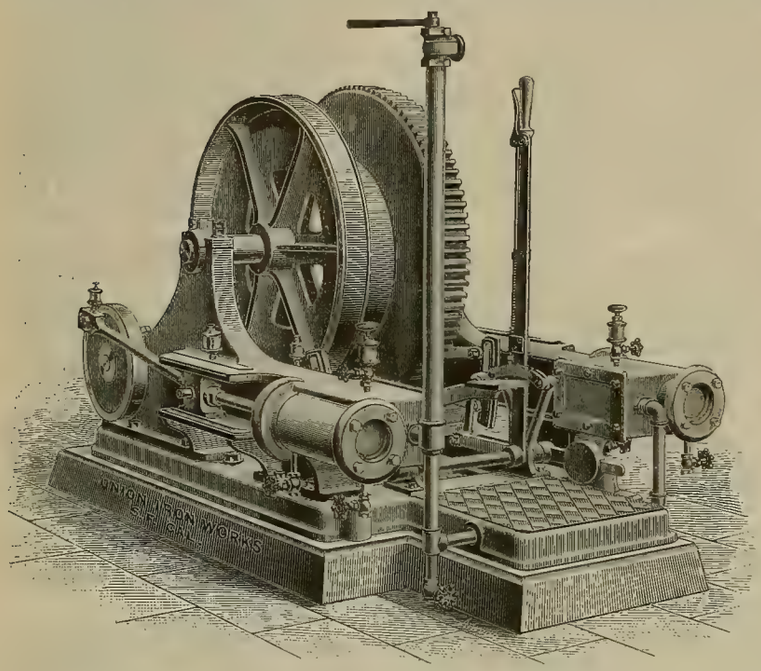
A Boston company has been formed to operate the Williams placer, in the Swan River district, during the season.

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DOUBLE CYLINDER SINGLE DRUM HOIST



HOIST FOR PROSPECTING.

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The entire hoist is self-contained, being mounted on an iron sole plate or bed which carries all the operating levers and provides a footboard for the operator. The engines are provided with reversible link motion and the drum with a broad strap brake, insuring safe and rapid work.

The general lines upon which this hoist is designed are neat, strong and substantial and all the operating parts are conveniently arranged.

The size herewith illustrated is the 4 in. x 10 in., rated at 15 horse power. The larger sizes, 8 in. x 12 in. and upwards are provided with post brakes.

The Mine and Smelter Supply Co., Denver, Colo.

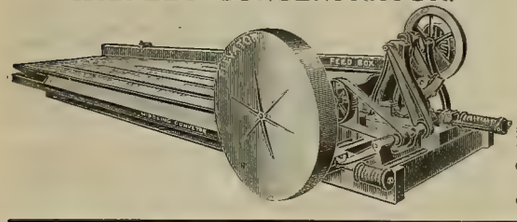
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For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Colo.; Mary Murphy Mine, St. Elmo, Colo.; W. E. Renshaw, Mayflower Mill, Idaho Springs, Colo.; H. E. Woods, Denver, Colo.

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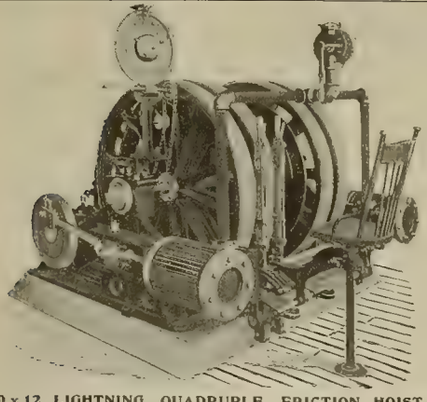
ASPEN, COLORADO, April 8, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Your favor of the 5th inst. at hand and noted. In regard to the Wilfley Table I wish to say that I consider it to be the best device in use to-day for concentrating fine ores; that it will save everything that a gold pan will; that it combines the clean saving of a Rittinger with the capacity of a buddle. I think that without question it will supplant in time all other devices for handling fine and slimy ores. This includes all the vanning machines and buddles.

This is higher praise than I am in the habit of giving, but I feel sure that it is deserved, and you may make any use of this that you desire. Yours very truly, [SIGNED] S. I. HALLETT.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

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The Russell Process.

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Park City, Utah.

Coast Industrial Notes.

—Los Angeles now figures on 100,000 population.

—Indications point to a very large California fruit crop this year.

—Tracy, Cal., reports the discovery of natural gas there in paying quantities.

—Three locomotives are now in service on the new road building from Oakdale, Cal., into Amador county.

—Los Angeles cites the fact that Colorado has ten smelters and argues that one should be built in the southern California metropolis.

—The Pacific Improvement Co. is about to file a bid for the construction of the deep water harbor at San Pedro, Cal., inside the $2,900,000 appropriation limit.

—So far no provision providing for the abrogation of the Hawaiian reciprocity treaty is in the tariff bill under present consideration by the United States Senate.

—Yesterday took place the first shipment from this coast of fir lumber to Japan to be used in the manufacture of tea chests, the Victoria carrying 200 M. from Tacoma, Wash.

—The California Northern Railway Co., recently incorporated in Arizona, proposes to build a railroad from Kramer, Cal., on the A. & P. road, to Randsburg, twenty-six miles. It is stated that the line will be in operation August 1, '97.

—The proposition of settlement made by the bondholders of the Mount Lowe Railroad at Pasadena, Cal., has been accepted by a majority of the unsecured creditors and will probably be accepted by all. The plan is to reorganize the company with a bond issue of $550,000. The present bonded indebtedness is $500,000.

—The total number of vessels on this coast is 1651, including every kind of craft. Built in California, 804; Washington, 426; Oregon, 227; Maine, 83; Massachusetts, 35; Pennsylvania, 19; New York, 11; Alaska, 5; unknown or foreign, 20; Delaware, 5; New Hampshire, 4; Connecticut, 3; New Jersey, 2; Rhode Island, 2; Idaho, 1; Michigan, 1. The oldest listed vessel is the Oregon, built in Maine in 1848. The first one built in California is the Pike Co., in 1851; the next oldest the Eclipse, in 1852.

Commercial Paragraphs.

THE second edition of Catalogue No. 4 is just issued by the Union Iron Works, 222 Market St., San Francisco, in which the Union Improved Ore Concentrator is elaborately illustrated and described, containing much of practical interest to every mining man in connection with one of the most important processes connected with ore treatment.

THE Edison gold saving machine for placer mining, also designed to operate in connection with stamp mills, is being manufactured by the Edison Machine Company of Phœnix, Arizona. The managers state that they expect to arrange for the manufacture of the machine in Oakland, Cal. The chief points of vantage claimed by the builders is that it requires a minimum amount of water, which is automatically used over many times, and its lightness and simplicity make it adaptable to all localities. A very close saving is claimed for it.

THE Jeffrey Manufacturing Company of Columbus, Ohio, is out with its 1897 catalogue descriptive of chains and labor-saving devices. This catalogue is gotten up in handsome style and is one of the most complete of its kind published. The first part is devoted to illustrations of labor-saving appliances as applied to various industries, while the balance of the book is devoted to the illustrating of its various chains, sprocket wheels, cable conveyor fixtures, and general mill and factory supplies. It is a valuable reference book and its price lists are such as will be of interest to all using labor-saving appliances. Copies can be had by addressing the above company at Columbus, New York, Philadelphia, Chicago, St. Louis and Denver.

JOHN O. NORBOM, representing the Joshua Hendy Machine Co. of San Francisco, has a contract with Dier, Davidson & Russell, for the Tinhorn Quartz Mining Company, Fairview Camp, Okanogan county, B. C., for a mill, which will be working in sixty days and will have the largest capacity of any mill yet erected in British Columbia—sixty tons a day. The power will be supplied by a 120 H P. engine, which will enable the company to increase the capacity to 120 tons a day. The plant of the Tinhorn Company's mill includes a Corliss engine with modern steel boilers, a Hercules Improved Blake ore crusher, also Hendy-Norbom ore concentrators. The mill will be automatic. The plant includes an incline tramway connecting the ore bins at the mouth of the tunnel, the cars dumping ore automatically at the mill.

Recent California Mining Incorporations.

Gaston Hill Placer Mining Company, San Jose; S. P. Saunders, L. M. Simonton, J. R. Kocher, J. G. Jury, A. D. Dannes; capital stock $12,000—all subscribed.

Marklee Mining Company, San Francisco; T. Flint, San Juan, G. W. Root, H. Wilson, G. P. Rixford, W. C. Smith, San Jose; capital stock $100,000—$60,000 subscribed.

Little Butte M. and M. Co., Los Angeles; W. Gillelen, E. T. Earl, H. K. Gregory, E. L. Allen, Los Angeles; W. J. Clark, H. C. Oakley, Ontario; capital stock, $500,000; subscribed, $400,000.

Middlemarch Copper Co., Los Angeles; E. J. Gird, Tombstone, Ariz.; W. K. Gird, Chino; M. M. O'Gorman, H. B. Ellis, I. B. Hamilton, D. C. Morrison, Los Angeles; capital stock, $1,000,000; subscribed, $524,000.

Personal.

EMIL R. ARADIE has returned from South Africa and will superintend a mine in Sonora, Mexico.

W. S. BLISS of Carson has been appointed manager of the Chainman mines at Ely, Nevada, for the new owners.

LOUIS JANIN JR. sailed for Australia last Thursday and will be there, making Sydney his headquarters, for some time.

J. H. GILMORE has been appointed superintendent of the Mechanics' Fair, which begins at the Pavilion in San Francisco, August 17.

JOHN W. MACKAY will spend part of the summer at the Allison Ranch mine in Grass Valley, Cal., owned by him and James L. Flood.

R. T. BAYLISS, formerly manager of the Montana Company (the Drum Lummon) has been appointed consulting engineer of the Exploration Company of London, taking up much of the work heretofore done by Hamilton Smith.

S. L. THELLER of San Francisco has bought from A. B. Bowers all the latter's interest in his hydraulic dredge, so far as California and Oregon are concerned. The purchase price is said to be $250,000, which includes prospective judgments for damage suits instituted against various parties by Bowers.

W. WESTON, mining engineer of Cripple Creek, has returned from Georgetown, Colo., where he made an examination and report on the property of the Doric Gold Mines, Limited, for the London Company. He was accompanied by his colleague, Capt. Jno. D. Murphy, and the chairman of the company, Mr. W. E. Swanton.

DR. JORDAN, president of Stanford University, and one of the British-American Bering Sea Commission, recently delivered at Cornell University a lecture on the Alaska fur seal, in which he spoke in very harsh terms of the Paris tribunal under whose finding the present status of the seal question has been reached. He called it a farce; said it had brought contempt upon the name of arbitration, and declared that in the list of regulations drawn up by the tribunal for the preservation of the seals there was only one of any value whatever, that one, namely which provides for a revision of the regulations every five years.

PROF. A. C. LAWSON of the University of California has been named by the Board of Regents of that institution its delegate to the International Geological Congress at St. Petersburg, Russia, which will probably be the greatest gathering ever held of men distinguished in that branch of science. An attractive feature of the meeting is the unusually extensive excursions to take place before and after the meetings. These will be into Finland, the Ural mountains, the oil fields of the Caspian, parts of the Black sea and the Caucasus mountains. All these excursions will be made in special trains at the expense of the Russian Government. Prof. Lawson will take the opportunity afforded to look into the geological questions of the oil fields of the Caspian particularly, which are in many respects similar to those of California. Prof. Lawson has done good work while in California and will worthily represent the University.

Recently Declared Mining Dividends.

Homestake Mining Company, South Dakota, $31,250; payable April 25th.

The Anaconda Copper Company of Montana has announced its regular semi-annual dividend of 5 per cent or $1,500,000.

Alaska-Treadwell, Alaska, $75,000; payable April 28th.

Alaska-Mexican, Alaska, $18,000; payable April 28th.

The Anchoria-Leland Mining Co., Colorado, $6000; payable April 15.

The Calumet & Hecla Copper Mining Co., Michigan, $500,000; payable April 23.

The Portland Mining Co., Colorado, $30,000; payable April 15.

Galt Mining Co., Montana, $10,000; payable April 20.

Idaho, British Columbia, $25,000; payable April 25—a total to date of $175,000.

Morning Star Drift Gravel Mining Co., Placer Co., Cal., April 27, dividend No. 77, $5 per share; payable immediately.

Santa Rosalia M. Co., Mexico, 10 cents per share; payable to-day.

Situations Wanted.

SITUATION WANTED by a First-Class Electrician and Engineer,

Capable of developing and handling electric power and light plant. The applicant has a first-class reputation and can install a plant with as small amount of money as any one in this line of business. I want to deal with first-class parties only, as I work for an employer's interest. Address S, Mining and Scientific Press.

Expert Chemist, Assayer, Surveyor, (leaving college) understands mill work, cyanide process, smelting ore, etc., wants place. Salary secondary. Address "Miner," 518 Third Street, Oakland, Cal.

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Wants engagement with mining company. Sixteen years' experience. Strictly temperate. Address "Bellevue," this office.

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Old Iron Shafting,

5 to 15 in. Diameter.

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Five-Stamp Mill with Rock Breaker and Two Concentrators.

All in First-Class Condition. F. o. b. steamer at San Francisco or Puget Sound.

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Gold Mill, To Lease or Purchase.

On Mine or in Good Custom District.

Address "V," Mining and Scientific Press Office.

FOR SALE.

The four Boilers now in use at the Crown Mills, together with Fronts, Valves, Grate-Bars, etc., are offered for Sale.

Delivery can be made on or about the 1st of May. For further particulars, inquire of

STOCKTON MILLING CO.,

STOCKTON..... .....CALIFORNIA.

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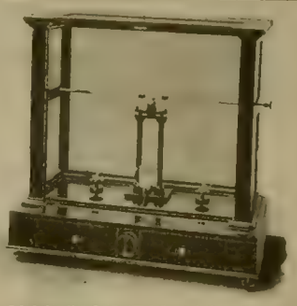
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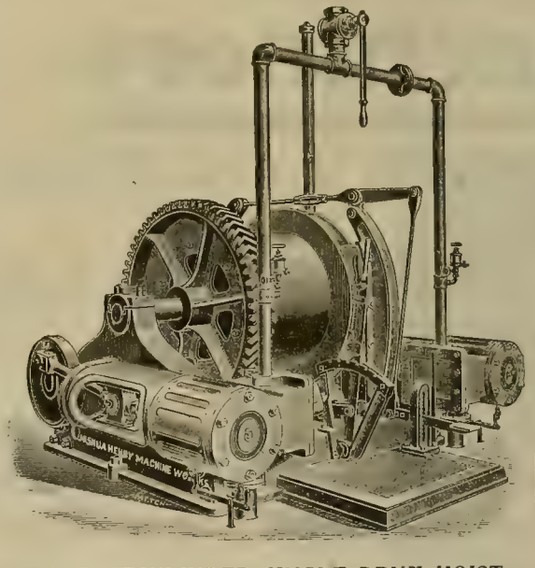
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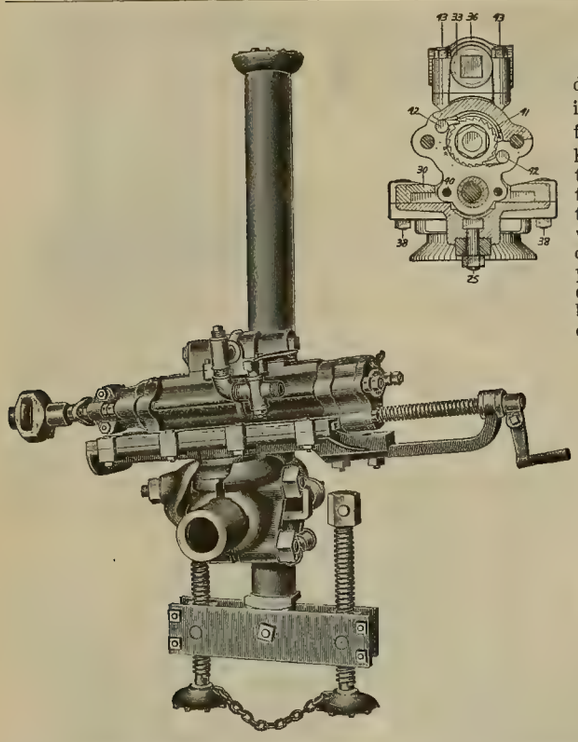
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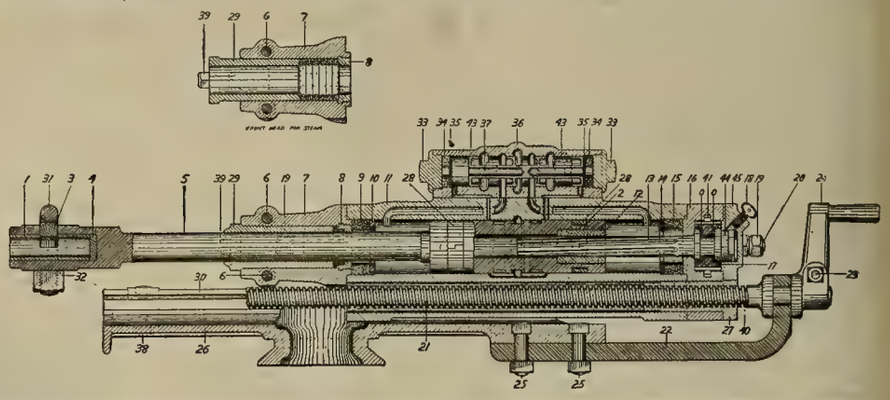
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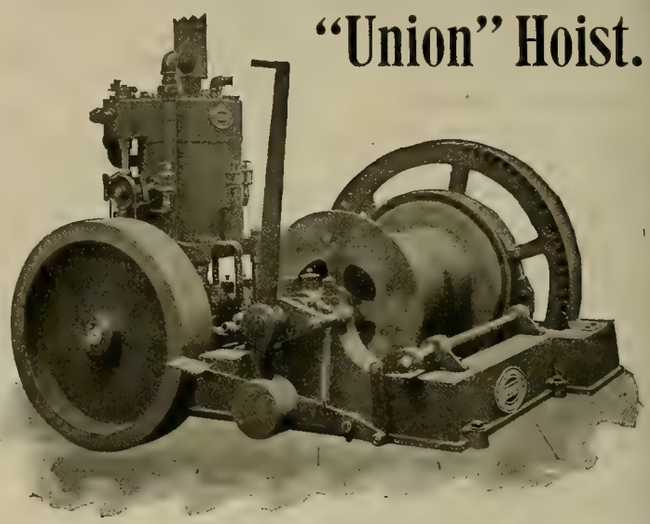
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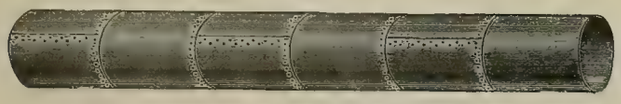
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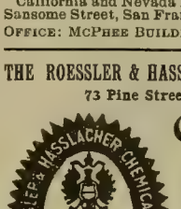
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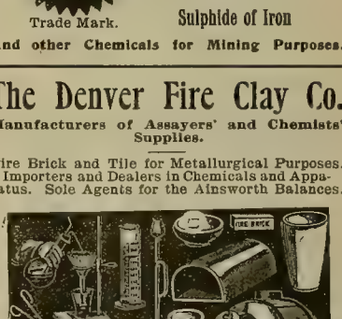


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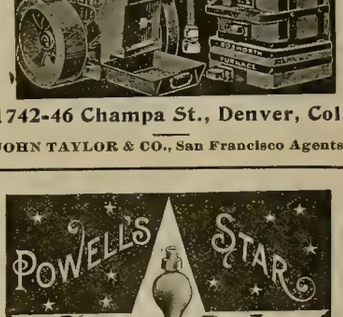
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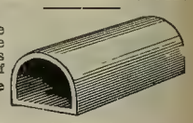
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ANGELS IRON WORKS,
DEMAREST & FULLEN, Props.
Mining Machinery.
ANGELS, CAL.
Write for estimates on complete Milling, Mining and Reduction Plants.

E. E. BURLINGAME'S ASSAY OFFICE AND Chemical Laboratory. Established in Colorado, 1866. Samples by mail or express will receive prompt and careful attention. Gold and silver bullion refined, melted and assayed or purchased. Address 1736 and 1738 Lawrence Street, Denver, Colo.

IF YOU HAVE A SMELTER--YOU WANT IT.
IF YOU HAVE A COPPER MINE--YOU NEED IT.
IF YOU HAVE A CYANIDE PLANT--YOU OUGHT TO HAVE IT.
IF YOU OWN CHLORINATION WORKS--YOU SHOULD BUY IT.
IF YOU ARE INTERESTED IN A MINE OR MILL--YOU CAN'T DO WITHOUT IT.

What? P. & B. Paint.

IT IS ABSOLUTELY ACID PROOF---TRIED AND PROVEN.

Manufactured by
PARAFFINE PAINT CO., San Francisco. Los Angeles.
You Can Order It From Your Dealer.

A. H. WARD. ——✦ ESTABLISHED 1869. ✦—— H. C. WARD.
C. A. LUCKHARDT & CO.,
NEVADA METALLURGICAL WORKS,
71 & 73 STEVENSON STREET, - - - - SAN FRANCISCO, CAL.
Assaying, Analyses, Sampling.
PRACTICAL WORKING TESTS OF ORE BY ALL PROCESSES.
STAMP MILL AND CONCENTRATOR IN OPERATION ON PREMISES.

TUTTHILL WATER WHEEL.

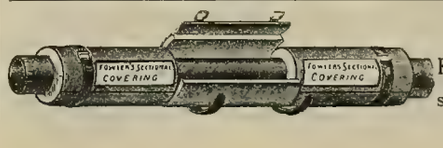
The Latest and Best Jet Wheel in the Market, BARRING NONE.
Wheels, Buckets and Nozzles Designed to Suit Special Requirements. When Head and Conditions Are Given.
Theoretically as Well as Practically Perfect. Highest Efficiency Guaranteed.
CONTRACTS TAKEN FOR ANY SIZE PLANT.
We have a Sensitive, Simple and Durable Governor, entirely new and novel, that will positively regulate speed of wheel. Specially adapted for electric railway and lighting plants.
Write for Catalogue.
OAKLAND IRON WORKS, Builders.
108 FIRST STREET, SAN FRANCISCO. Telephone 1007 Main.

Thomas Price & Son,
Assay Office, Sampling Works
And Chemical Laboratory.
524 Sacramento Street, San Francisco, Cal.

HORACE F. BROWN, CONSULTING ENGINEER.



Special attention given to preparing plans for the Chlorination and Bromine Processes of Treating Gold Ores.
PATENTEE { Brown's Complete Automatic Mill Process. Brown's System of Mechanically Stirred Roasting, Cooling and Conveying Furnaces, Etc.
1607-8 Manhattan Building, Chicago, Illinois.



HOME MANUFACTURE.
FOWLER'S
Fossil and Asbestos Sectional Covering.
As a Non-Conductor, Unequaled.
Special Rates for Steam Boilers and Drums
C. G. Fowler, 656-58 Howard St., S.F.

FRASER & CHALMERS, CHICAGO, ILL., U. S. A.

ENGINEERS AND MANUFACTURERS OF **MINING AND METALLURGICAL MACHINERY.**

Beg to announce that they now manufacture and control the sale of the unrivaled

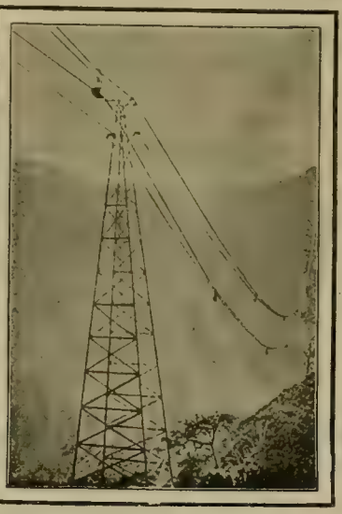
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Over Seven Hundred lines in operation.

Spans up to Two Thousand feet and more.

Highest Awards at World's Columbian Exposition.

Catalogues sent on application, giving full description and details.



Otto Aerial Tramways

Give the best working results in every case, and never-failing satisfaction.

All difficulties of transportation surmounted by an economical and effective carrier.

Be sure you investigate the Otto Tramway before purchasing.

Write us your requirements and we will take pleasure in preparing complete specifications.

FRASER & CHALMERS,
Manufacturers of the
Otto Tramway.

THE PELTON WATER WHEEL,

EMBRACING IN ITS VARIATIONS OF CONSTRUCTION AND APPLICATION

THE PELTON SYSTEM OF POWER.

In simplicity of construction, absence of wearing parts, high efficiency and facility of adaptation to varying conditions of service, the **PELTON** meets more fully all requirements than any other wheel on the market. Propositions given for the development of water powers based upon direct application, or

ELECTRIC TRANSMISSION

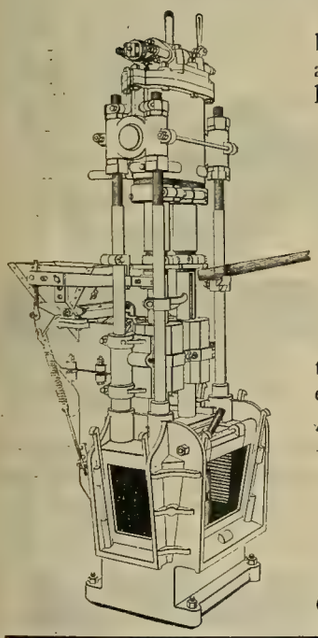
Under any head and any requirement as to capacity.

CORRESPONDENCE INVITED. CATALOGUE FURNISHED UPON APPLICATION. ADDRESS

PELTON WATER WHEEL CO.,

121 and 123 Main Street, - - - - - San Francisco, Cal.

A STEAM ORE STAMP.



One of the BONANZA MINES of the Black Hills was developed by a **TREMAIN STEAM STAMP MILL,** installed last summer at a cost of about $1600. After six months' run the superintendent wrote the following letter:

HILL CITY, S. D., Feb. 2, 1897.

Gates Iron Works, 650 Elston Ave., Chicago, Ill.—GENTLEMEN: It gives me great pleasure in informing you of our success with the Tremain Steam Stamp Mill which we have been running since last July. We have been running on hard, white quartz, some of it of a flinty character and a small portion of it slightly decomposed. We average about ten tons every 24 hours through a forty-mesh screen. If our financial standing had been a little better, so we could have put in a small engine and rock crusher, I am confident we could put through 14 to 15 tons in 24 hours. The wear and tear is considerably less than an ordinary stamp mill, it all being on the shoes and dies. The last we used of these were of the aluminum steel, which are the best wearing shoes and dies I have ever seen. The parts are all well made and durable, I having failed to see any weak point about the machinery.

We use one cord of pine wood in 24 hours, and run the mill with 70 to 80 lbs. of steam.

I have followed mining in connection with milling for thirty years and have never seen its equal for convenience, durability and cheapness. To parties wishing to purchase a quartz mill I cheerfully recommend the Tremain Steam Stamp Mill for its small cost, economy in operation and complete results of working. Very truly yours, [SIGNED] JAMES C. McDONALD, Supt. St. Elmo M. & M. Co.

This Mill has the capacity of a 5-stamp gravity mill and costs less than half to install. Automatic feeder of approved design. Weight of entire Mill 3300 lbs. Made sectional for mule-back transportation.

AGENTS FOR CALIFORNIA, OREGON AND WASHINGTON:
PROSPECTIVE MINING AND MACHINERY CO.,
127 FIRST STREET, SAN FRANCISCO, OR PORTLAND, OREGON.

Manufactured Exclusively by

GATES IRON WORKS,

650 Elston Ave. Dept. UU. CHICAGO.

The Cheapest Advertising : : : :

It that which gives the largest results in proportion to the amount expended.

GEARS. P. T. TAYLOR & CO.

523 Mission St., San Francisco, Cal.

Gold IS Wanted,

And Colorado has enough for the whole world. Yours for the finding; shall we tell you where to look? Please send six cents to cover postage on an elaborate book called "Colorado's Gold," 128 pages, with 80 new half-tone engravings. Address

B. L. WINCHELL,
G. P. A. Un. Pac., Denver & Gulf R'y.,
DENVER, COLO.

SANTA FE ROUTE.

The Great SANTA FE ROUTE, with Its TEN THOUSAND MILES of Track,

Reaches all the principal mining camps in COLORADO, NEW MEXICO, ARIZONA and CALIFORNIA.

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THE NEW EL DORADO,

Can be reached by no other line. Double daily stages run between KRAMER and RANDSBURG.

H. C. BUSH, A. G. P. A.
Ticket Office, 644 Market Street,
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THE

CRIPPLE CREEK MINING DISTRICT

IS PRODUCING

Over $1,000,000 per Month IN GOLD.

Reached by

THE FLORENCE AND CRIPPLE CREEK RAILROAD,

THE GOLD BELT LINE

In Connection with the Denver & Rio Grande.

For information, address
C. F. ELLIOTT, General Traffic Agent,
DENVER, COLO.

GOLD IN COLORADO!

Colorado has within its limits some of the greatest gold mines that have ever been discovered. In Cripple Creek in 1892 there were a few prospectors looking over the hills; in 1895 the camp turned out over $8,000,000 in gold. Leadville, the old bonanza camp and the mineral product of which made Denver what it is to-day, is becoming a big producer of gold. New inventions for working low-grade gold ores, together with the discoveries made to work rebellious ores, have opened up a field for the miners such as they have never enjoyed before, and Colorado has inducements to offer such as no other district in the world possesses; the record of the State in gold production for the last three years speaks for itself. Among the other prominent camps in the State are Telluride, Ophir, Rico, Silverton, Mineral Point, Durango, La Plata, Ouray, Saw Pit, Ironton, the Gunnison district and many others. New finds are being made and new camps are springing into existence every day. The Denver & Rio Grande Railroad, which is the pioneer road of Colorado and which has always been the miner's friend, reaches all the mining camps in Colorado. For elegantly illustrated descriptive books, free, of mines in Colorado, send to

W. J. SHOTWELL, - - - General Agent,
314 California St., San Francisco, Cal.

S. K. HOOPER,
General Passenger Agent, - - DENVER, COLO.

THE TRAIL CREEK, CŒUR D'ALENE AND BAKER CITY

★ Mining Districts

ARE REACHED DIRECT BY THE

O. R. & N.

Steamship and Rail Lines.

THROUGH TICKETS AND SPECIAL RATES.

FRED F. CONNOR, Gen'l Agent. TICKET OFFICE, 630 Market St.

INVENTORS, Take Notice!
L. PETERSON, MODEL MAKER,
226 MARKET ST., N. E. Corner Front (Up Stairs), SAN FRANCISCO. Experimental machinery and all kinds of models. Tin and brasswork. All communications *strictly confidential.*

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING APRIL 20, 1897.

581,105.—BOTTLE STOPPER—J. A. Donahue, Los Angeles, Cal.
581,021.—WAVE POWER—J. M. Dyer, S. F.
581,023.—INSULATOR—S. L. Foster, S. F.
581,157.—BOTTLE—W. S. Hannaford, Pasadena, Cal.
581,159.—AMALGAMATOR—J. A. Hedge, Los Angeles, Cal.
581,212.—FEED WATER HEATER—Jones & Wilson, Fulton, Or.
581,006.—STONE CUTTER—D. Kilpatrick, Los Angeles, Cal.
580,877.—CURLING IRON—E. K. Middlekauf, S. F.
581,012.—POWER TRANSMITTER—U. Root, Coquille, Or.
580,959.—MOP HEAD—P. J. Scharbach, Woodburn, Or.
581,044.—TELEPHONE SIGNAL—W. F. Smith, S. F.
580,965.—HORSE TRAINING DEVICE—J. W. Weathers, Llano, Cal.
581,188.—MILK TESTER—G. G. Wickson, S. F.
581,095.—RUBBER PEDALS—I. J. Willard, Sacramento, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

POWER TRANSMITTING MECHANISM.—Uriah Root, Coquille, Or. No. 581,012. Dated April 20, 1897. This invention relates to the class of power transmitting mechanisms. It consists essentially of a centrally pivoted lever, with means for operating it, links depending from the lever with swinging rods, ball and socket connections between the rods and the links and a shaft having cranks set at right angles, with connections between the cranks and rods. A centrally pivoted lever has pedals upon it to receive the feet and the central handle, so that it may be operated by both hand and foot power.

WAVE POWER.—J. M. Dyer, San Francisco, Cal. No. 581,021. Dated April 20, 1897. This invention relates to a means for applying the motion and force of the waves and in transmitting this motion and converting it into a rotary motion so that it may be applied to machinery for various purposes. It consists essentially of a float having a rigid arm or beam with which the float is slidably connected, the beam having a ball-bearing or universal joint at the inner end about which it is movable, guy ropes or chains connected with opposite sides of the float and diverging to the points of anchorage which are axially in line with the ball joint, a framework above carrying a driving shaft and connections between the float and shaft, so that the movements of the former will be transmitted to the latter. The power may be transmitted directly or by means of a pivoted lever carried on the framework, there being a connection between the float and the lever and also between the lever and the driving shaft.

RUBBER ATTACHMENT FOR PEDALS.—Frank J. Willard, Sacramento, Cal. No. 581,095. Dated April 20, 1897. This invention relates to a means for attaching rubber cushions or foot pieces to the pedals of bicycles. The object is to provide such a construction as will allow the rubber foot-pieces to be readily attached to or detached from the pedal. It consists essentially of a pair of rubber strips or pieces and frames exterior of and adapted to clamp the bases of said strips, each of said frames having a laterally projecting flange adapted to engage the edges of the pedal and a spring connecting the frames, whereby they may be stretched to fit the pedal and be held by the tension of the spring.

SECTION INSULATOR FOR ELECTRIC RAILWAYS.—Samuel L. Foster, San Francisco, Cal., assignor to the Market St. Railway Co., same place. No. 581,023. Dated April 20, 1897. This invention relates to those devices used on electric railways, especially of the overhead class, and section insulators, insulated crossings, frogs and switches, according to the particular use in which they are employed, all of them being in one form or another interposed in the path of travel of the trolley. It consists of section insulators and other devices interposed in the path of the trolley having a terminal member to which the end of the trolley wire is connected, said member having an inclined plane or planes diverging with respect to each other adapted to gradually receive or part with the bearings of the flanges of the trolley wheel before or after said wheel leaves or comes to its bearing on the wire, according as it may be entering upon or leaving the terminal.

The right of the advertiser to know the measure of his purchase in circulation is no less than the right of the publisher to know the weight of print paper received from the mill.

HERCULES GAS, GASOLINE AND DISTILLATE ENGINES.

HOISTING ENGINES, 2 h. p. to 200 h. p. ✦ STATIONARY ENGINES, 1 h. p. to 200 h. p. ✦ MARINE ENGINES, 2 h. p. to 200 h. p.

Our newly designed and perfected DISTILLATE VAPORIZER insures a saving of 50% on cost of running. Just ½ your expense SAVED BY USING A HERCULES in place of ANY other. We make no exception.

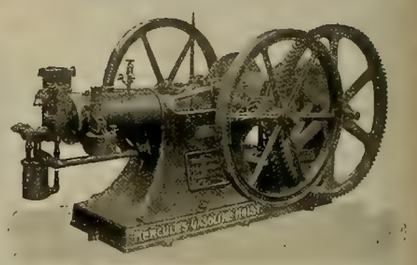
NEARLY 3000 HERCULES HOISTING, STATIONARY AND MARINE ENGINES IN ACTUAL USE. HIGH GRADE.

We claim full power, automatic and positive adjustment regulating speed and consumption of fuel in proportion to work being performed. No spring electrodes to burn out. All springs are outside. Point of ignition, speed and amount of fuel can be changed while engine is in operation.

WRITE FOR ILLUSTRATED CATALOG.

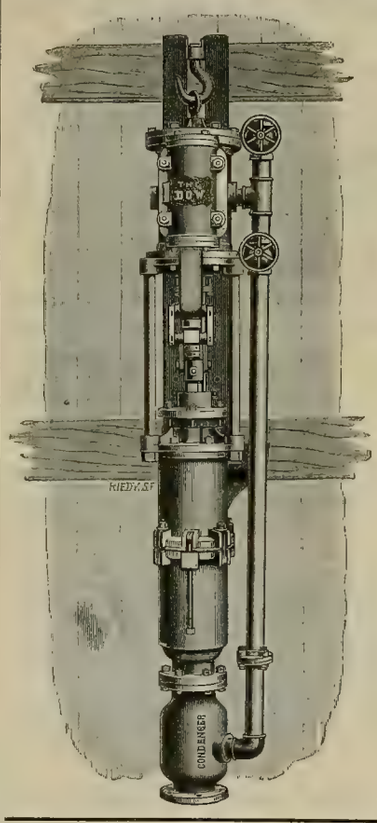
ESTABLISHED 1880. Address HERCULES GAS ENGINE WORKS,

WORKS: 215,217,219,221,223,225,227,229,231 Bay St. OFFICE: 405-407 Sansome St., San Francisco.



DYNAMOS FOR ELECTRIC LIGHTING.
D. D. WASS, Electrical Engineer, 56 First Street, San Francisco, Cal.

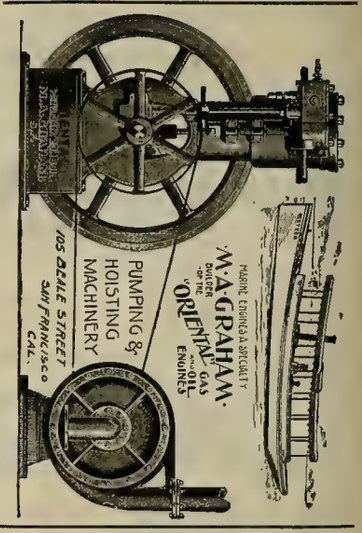
DOW STEAM PUMP WORKS,
OFFICE AND WORKS: 114 and 116 BEALE St., San Francisco.
—— MANUFACTURERS OF ——
Dow's Improved Steam Pumps,
SINGLE OR DUPLEX, FOR EVERY POSSIBLE DUTY.



MINING PUMPS,
Irrigation Pumps,
Artesian Well Engines,
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For Stationary Engines or Steam Pumps.
Power Pumping Machinery,
Speed Governors,
BALANCE VALVES AND PRESSURE REGULATORS FOR STEAM PUMPS,
Etc., Etc.
Correspondence Solicited. Send for Catalogue.



Roller, Steel and Special CHAINS —FOR— ELEVATING AND CONVEYING MACHINERY
FOR HANDLING MATERIAL OF ALL KINDS.
COAL MINING MACHINERY.
WIRE CABLE CONVEYORS. For long and short distance conveying.
Western Branch, Denver, Colo.
THE JEFFREY MFG. CO., Columbus, Ohio.
Send for Catalogue. 163 Washington St., New York.





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Cobb & Hesselmeyer,
DESIGNING AND CONSULTING
Mechanical and Hydraulic
ENGINEERS
Plans and Specifications for Machinery of MINES and MILLS. Improvement and Development of WATER POWER for All Applications. Will give PERSONAL SUPERVISION During the Construction and Erection of All Work, if Desired. Twenty Years' Experience.
TELEPHONE BLACK 2403.
421 Market Street.....San Francisco, Cal.

SAN FRANCISCO Pioneer Screen Works
JOHN W. QUICK, Prop.
Improved Facilities! Finest Work! Lowest Prices!
Perforated Sheet Metals, Steel, Russia Iron, American Planish, Zinc, Copper and Brass Screens for All Uses.
—MINING SCREENS A SPECIALTY.—
221 and 223 First Street, San Francisco, Cal.

Hoskins' Patent Hydro-Carbon Blow-Pipe and Assay Furnaces.



No dust. No ashes. Cheap, effective, economical, portable and automatic.
SEND FOR PRICE LIST TO
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THOUSANDS Now in Use Over the World.
TRUAX Patent Improved
Automatic Ore Cars.
THEY ARE THE BEST AND CHEAPEST.





SCHAW, INGRAM, BATCHER & CO., AGENTS,
Pat. Jan. 5, '92, Aug. 27, '95. Send for Catalogue. Sacramento, California.



QUARTZ SCREENS
A specialty. Round, slot or punched slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S.F.

For Sale at a Bargain.
One new GOLD KING AMALGAMATOR—never used. Apply to Marshutz & Cantrell, N. W. corner Main and Howard streets, San Francisco, California.

RISDON IRON WORKS,

Office and Works: Cor. Beale and Howard Sts., San Francisco.



A=.....inches.
B=..... "
C=..... "
D=..... "
E=..... "

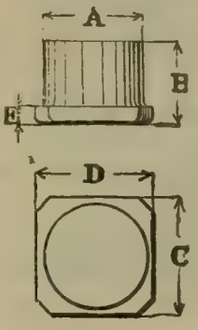
MINERS, ATTENTION!

We beg to call attention to our "RISDON HAMMERED" Shoes and Dies, which are made of a special quality of steel, are hammered and then compressed in moulds so as to give the greatest possible density.

These Shoes will outlast any other make and will not chip or cup.

We have attached a sketch showing sizes; fill in the size of your Shoes and Dies, and order a trial set.

Our prices are as low as any, and the article we offer should commend it to all mine owners and mill men.



A=.....inches.
B=..... "
C=..... "
D=..... "
E=..... "

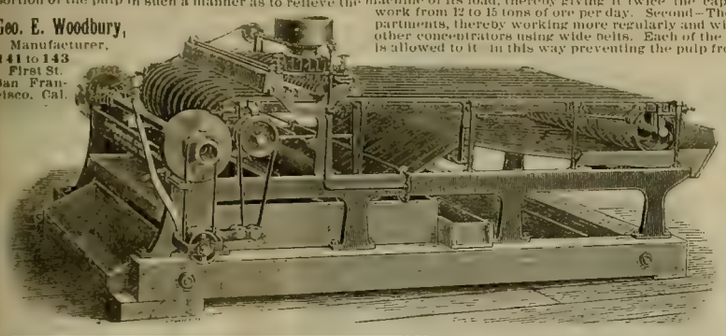
When Writing please mention the MINING AND SCIENTIFIC PRESS.

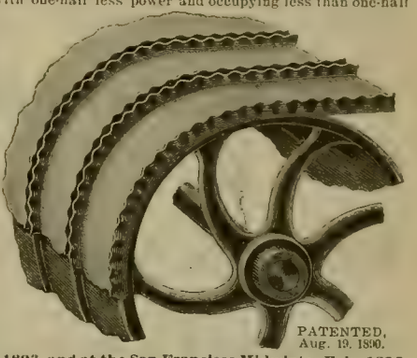
THE WOODBURY ORE CONCENTRATOR WITH IMPROVED BELTS

was awarded the Highest (Bronze Medal) Premium at Mechanics' Institute, 1890 and 1891. MORE THAN DOUBLE THIS CAPACITY with one-half less power and occupying less than one-half the space of any other concentrator. Built of best Steel and Wrought Iron. Strong and durable. Price $575 f. o. b. Send for Catalogue and Testimonials.

The annexed cut shows the belt in its improved form, which consists of corrugated edges, to form an expanding top edge. THE IMPROVED MACHINE HAS THE FOLLOWING MERITS: First—The Improved belts, which consist of seven, are constructed and arranged so as to allow each belt to receive a portion of the pulp in such a manner as to relieve the machine of its load, thereby giving it twice the capacity of other concentrators, and enabling it to work from 12 to 15 tons of ore per day. Second—The machine equalizes the load by several compartments, thereby working more regularly and with much less attention than is necessary to give other concentrators using wide belts. Each of the belts on this machine takes care of the pulp that is allowed to it in this way preventing the pulp from running to the lower side of it, as is the case when a machine becomes out of level where wide belts are used. Third—The belts run on a perfect line, needing no adjustment to prevent their running from side to side, as in other concentrators. Fourth—The belt surfaces are improved by indentations and corrugations, causing the Concentrator to save fine sulphurets and quicksilver, and perform close work. Fifth—The belts have fluted or corrugated edges, to form an expanded top edge, which effectually prevents from cracking. Sixth—The feed arrangement is perfect. Seventh—The machine is constructed of iron, with steel crank-shaft self-oiling boxes, and everything made in the most thorough manner, enabling it to run with very little attention or wear.

Geo. E. Woodbury,
Manufacturer,
141 to 143
First St.
San Francisco, Cal.





PATENTED, Aug. 19, 1890.

This Concentrator took the 1st prize at the San Francisco Mechanics' Institute in 1890, 1891 and 1892, and at the California State Fair in 1892; it took the 1st prize at the World's Columbian Exposition 1893, and at the San Francisco Midwinter Fair, 1895.

THE GUTTA PERCHA AND RUBBER M'F'G CO.

30 and 32 FREMONT ST., SAN FRANCISCO.

Spadone's Concentrator Belts. Patented.

The "SPADONE" Curved Edge Concentrator Belt is attracting much attention among mining men, its merits appealing to the millman of practical experience.

Illustration (Fig. 1.) shows a cross-section, and (Fig. 2.) shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

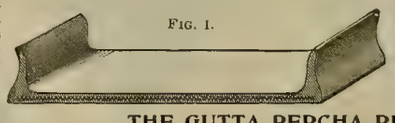


FIG. 1.

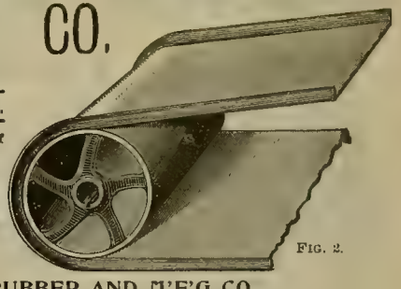


FIG. 2.

We shall be pleased to quote you also on Water, Air Drill, Steam, Suction and Fire HOSE, RUBBER BELTING and RUBBER PACKING. Correspondence Solicited.

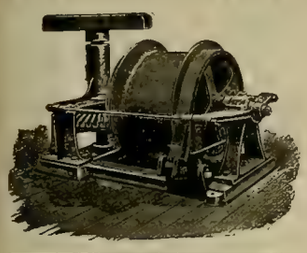
THE GUTTA PERCHA RUBBER AND M'F'G CO.
TELEPHONE, MAIN 1813.

JOSHUA HENDY MACHINE WORKS,

No. 42 FREMONT STREET, SAN FRANCISCO, CAL.

—BUILDERS OF—

"Davis" Horse Power Whims. Ore and Rock Cars.



Specialty of
PROSPECTING, MINING and MILLING PLANTS.

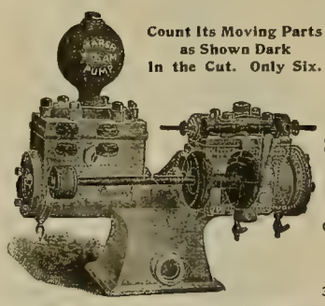
ORE and WATER BUCKETS.

"T" RAIL OF USUAL WEIGHTS, EITHER NEW OR SECOND-HAND, FOR SALE CHEAP.



MARSH STEAM PUMP.

Count Its Moving Parts as Shown Dark In the Cut. Only Six.



ABSOLUTE ACTUATION AND REGULATION.
PATENT SELF-GOVERNING STEAM VALVE.
PATENT EASY-SEATING WATER VALVE.
NO OUTSIDE VALVE GEAR.

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Minimum of Weight, Wear and Waste.

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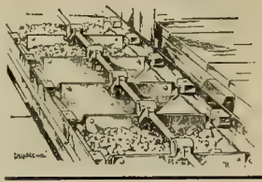
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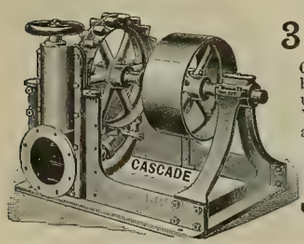
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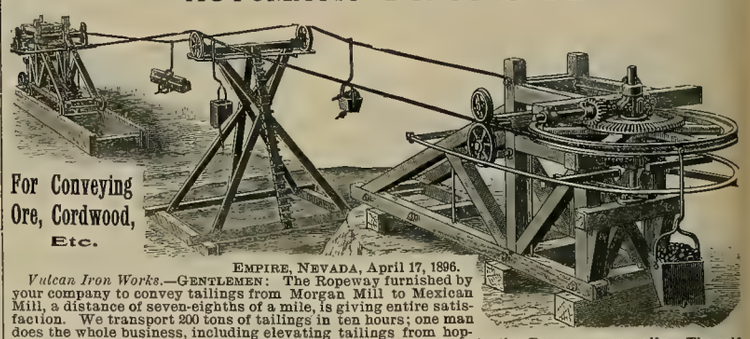
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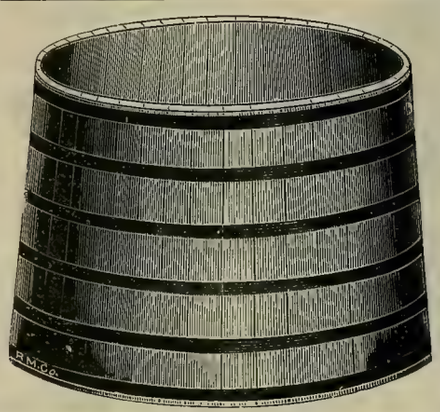
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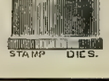
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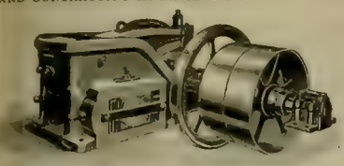
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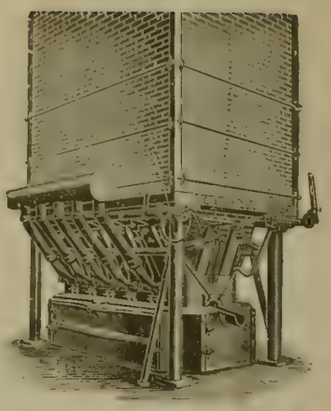
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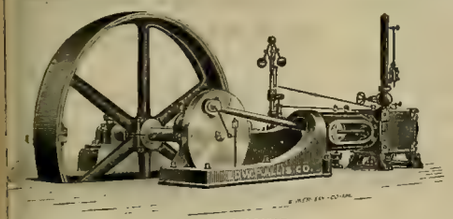
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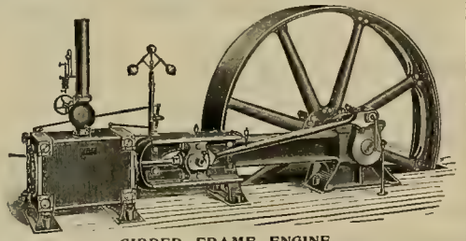
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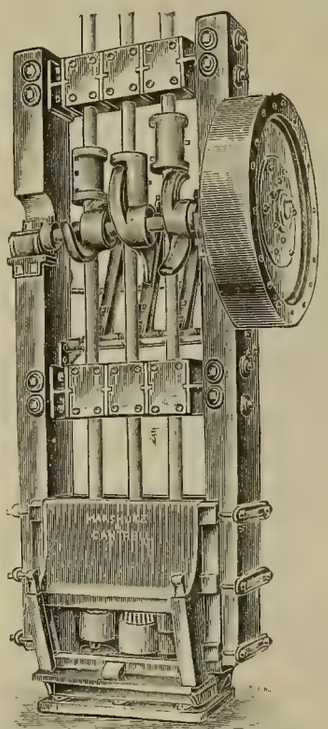


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Improved Self-Contained Three or Five Stamp Mill,

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Market Reports.

The Markets.

SAN FRANCISCO, April 29, 1897.

Jobbers continue to report a steady increase in the volume of goods going out on orders. The number of visiting merchants shows an increase. As yet very few changes have been made in prices of goods that will be affected by the tariff, owing to the uncertainty as to what modifications will be made by the Senate. The dry weather scare seems to have subsided, although it is admitted that many localities are greatly in need of rains; but others, again, can do without a precipitation for some time. At this writing fruit crop prospects are all that can be desired for a large outturn, while the cereal outturn promises over the average. Foundrymen and machinemen report active business in their lines, with orders running on every line of goods and machines in use. It is stated that fully 10 per cent more men are employed than at the corresponding time in 1896.

The local money market does not show any material change. The banks report a good supply of available funds with only a moderate inquiry for accommodation. Collections are said to be easy, with the retail trade owing less than usual at this season of the year. The banks hold to the opinion, unless the crops are injured, there will be quite a demand for money to move the crops, but there will be less storing by first hands. The latter will sell, provided prices for grain do not go much lower than are ruling now. There is considerable money coming in for putting into mines. It is stated that a large number of sales have been negotiated, while many others are under negotiation pending investigation. The decline in copper has caused some falling off in the inquiry for copper mines, but the inquiry for gold mines seems to be increasing. At the East the money markets work on easy lines. The renewal of gold shipments to Europe has not had any material effect on the situation there. The very large reserves, over $50,000,000, held by the Treasury, and the very large supply, over $80,000,000, in the vaults of the New York banks, admit of a large export movement. It is stated that the outward move is by importers to meet bills abroad. Our advices from Europe are to the effect that there is still a continued drain on England for gold, which keeps the premium for the yellow metal at strong figures.

New York Silver Prices.

NEW YORK, April 29. — Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	28 5-16	61¾
Saturday	28¼	61⅝
Monday	28¼	61 11-16
Tuesday	28 5-16	61 11-16
Wednesday	28 5-16	61⅝
Thursday	28 5-16	61⅝

	Copper.	Lead.	Iron.	Tin.
Fri.	11 25 @11 50	3 25	10 00@12 50	13 15
Sat.	11 25 @11 50	3 25	10 00@12 50	13 15
Mon.	11 25 @11 50	3 22½	10 00@12 50	13 15
Tue.	11 25 @11 50	3 25	10 00@12 50	13 25
Wed.	11 25 @11 50	3 25	10 00@12 50	13 30
Thur.	11 25 @11 50	3 25	10 00@12 50	13 35

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	15c Prem
New York Telegraphic Transfer	17½c Prem
London Bankers' 60 days	$4.87¼
London Merchants	$4.83
London Sight Bankers	$4.88¼
Refined Silver, per oz., 1000 fine	61⅝
Mexican Dollars	49@50

SILVER.—The market has held to fairly steady prices throughout the week. All advices from Europe are to the effect that the demand is slow and stocks are said to be accumulating. The only thing that keeps the market from going lower is the indifferent selling offers from America. With a selling pressure from this side, there is no question of lower prices than ever before known.

MEXICAN DOLLARS.—The market is slow from two causes. The first is that this is the wrong season of the year for much of a demand from the Orient, and the second is that the low price of exchange is against selling Mexican dollars. Exchange can be had at 49 cents, while the Mexican dollars would cost about 50 cents.

QUICKSILVER.—The market is quiet, but reported steady at quotations. Our New York advices state that quicksilver suffers somewhat in price from the weight of sharp competition, and sellers name a further decline. On April 24 lots of 100 flasks were quoted at $39 per flask and lots of 25 flasks at $39.25, while as low as 52 cents per pound was named on small jobbing parcels.

Our market is quoted at $40 for domestic consumption.

COPPER.—The market has held barely steady with us, owing to the low and weak markets at the East. New York advices state that, notwithstanding the heavy exports to Europe, stocks continue to accumulate, and in consequence there is some cutting in prices.

The local market is quoted as follows:

Ingot, jobbing	—@14¼
Ingot, wholesale	—@13½
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17

TIN.—In our market the demand for plate is light, owing to can makers' wants being supplied. Pig tin moves fairly at quotations. For a round parcel lower quotations could be secured.

We quote as follows in a jobbing way:

Pig, per lb	14½@ —
Plate, I C coke, heavy, per box	$4 05@4 15
" " " light, "	3 95@ —

LEAD.—There is nothing new to report and none expected until the Senate Tariff Committee reports the tariff bill. The consumption in this country is larger than last year, but fair, liberal supplies are against sellers.

Our market is quoted in jobbing lots as follows:

Pig	4 00 @ 4 25
Bar	— @ 4 50
Sheet	5 62½@ 6 12½
Pipe	4 87½@ 5 37½

SHOT.—The market is steady with only a fair jobbing demand reported.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do. " "	1 60

POWDER—The market is steady, with a large demand.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

BORAX.—The market is reported steady. The market is quoted as follows:

Refined, in car lots, in barrels	5
Refined, in carload lots in sacks	4¾
Powdered, in car lots	5
Concentrated, "	4¼

IRON.—There is nothing to report in our market outside of an increasing consumption. The East continues to report cutting by Southern furnacemen; but, notwithstanding it, trade is slow, owing to heavy orders having been placed a few weeks ago.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—Spot parcels and also near-by arrivals of foreign are unchanged. Domestic and coast coals are in fairly free offerings. The consumption of steam is larger than at this time last year.

We quote as follows:

SPOT FROM YARD—PER TON.

Wellington	$8 00@— —
Greta	6 00@ 6 50
Nanaimo	6 50@ 7 00
Cuiman	5 50@ 6 00
Seattle	5 50@ 6 00
Coos Bay	—@ 4 75
Cannel	8 00@— —
Egg, hard	12 00@13 00
Wallsend	6 50@— —

TO ARRIVE—CARGO LOTS.

Australian	5 50
Liverpool Steam	6 25
Scotch Splint	— —
Cardiff	6 25
Lehigh Lump	9 00
Cumberland	13 00
Egg, hard	10 00
West Hartley	6 50

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

ANTIMONY.—The market is easy.

Our market is quoted at 7½@8½c in a jobbing way. New York mail advices quote 7¼ 7¾c for Cookson's, 7@7¾c for Hallett's and 7c for Japanese.

NAILS.—The market is steady.

Wire, carloads, basis per keg			
" jobbing, " "			$2 25
Cut, carloads, " "			
" jobbing, " "			2 10

Chemicals.

Owing to the impression prevailing that the retroactive clause of the tariff bill will not hold, even if it is not struck out, and also that the House bill will be modified and not passed before towards the close of July, the market for about all kinds of chemicals is weaker. The East reports an easier market for all leading staples.

SPELTER.—The market is steady.

We quote our market in a jobbing way at 5 cents a pound.

NICKEL ANODES.—The market is easier.

PLATINUM.—There is a fair demand.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC. — The market is quiet at steady prices.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is easy.

We quote in jobbing lots at 50 cents per pound for ingots.

BISMUTH.—There is a fair demand.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is easy.

We quote in a jobbing way at 70 to 75 cents per pound.

BONEASH.—The marketis steady.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is easy at 2½c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is easier at $1.70 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a light demand at 2½c a pound from stores.

NITRATE OF SODA.—Advices from the East report a firmer market for spot, but weaker for shipments and distant arrivals.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

SULPHURIC ACID.—The demand is slow and market easy at quotation.

NITRIC ACID.—Our market is reported easier from store at 6½c per pound in carboys.

We quote in a jobbing way at 1½c per lb for 66%.

BLUE VITRIOL.—Our market is weaker. We quote in a jobbing way at 4½c per pound.

Mining Share Market.

SAN FRANCISCO, April 29, 1897.

The market under the lead of Con. Virginia sold down until the shares of that mine sold at $1.50—the strut points to which they were to go down. From this figure it began to recover making quite a move yesterday afternoon when they sold up to $1.85 on regular call. The points are out quite generally for Con. Virginia to sell at $2.50 or even higher a share. It is the belief with many that the inside pool has been steadily concentrating leading shares on the down grade from much higher figures than now rule. This opinion is based on the way in which the market is handled and also from well authenticated reports that large numbers of outsiders holding fair to good sized blocks of shares have either none or very few, and their holdings have drifted into strong hands. Aside from this the work in the mines is of such a character as to warrant asserting that in one or more mines it has been pushed in such directions that it would not take many days to show up considerable ore, notwithstanding strut reports put out by insiders and their "tools" or coppers" that there is no ore to be found. The history of the Comstock verifies the assertion that when the cry is "if they can only strike some ore" and the share market has been moving down for some time, the cry is made for the purpose of buying and not selling. The latter is down when prices are up and when ore strikes are reported. Gambling in mining shares is a veritable mint, but not to outsiders, but to the inside pool and mill owners. Continued low prices ruling for silver is against the management of the mines trying to get silver bearing ore, and in consequence the work done and that being done is with the view of showing up gold bearing ore which experienced Comstock miners assert is on a well defined lode to the west. There are some who affirm that gold bearing ore is also to the east of the lode. Aside from this when the powers that be are ready they can extract and mill at a profit the very large deposits of low grade ore, running from $8 to $16 and some $20 in quite a number of the mines. This ore being free milling can be made to pay dividends provided the mill rings or other persons do not appropriate the lion's share of the bullion. This, it is said, can be done without mine officials in this city having personal knowledge of it.

From the Comstock mines official letters report continued active work in Con. Virginia on several levels with the prospects on the north drift from the 600-foot upraise from the 1650-foot level, of quite a promising character. The writer's advices, while speaking favorably of the showing, are of such a character as to warrant the belief that it is not the intention to make public any information calculated to invite cupidity of outsiders at this stage of the game. As the drift is towards Ophir any improvement in it ought to have a favorable influence on the latter. The work in this mine on the 1000-foot and 1550-foot levels is practically unchanged, but it deserves watching. Some very good work is being done at different parts of the mine, which indicates more activity at early day, provided it is not stopped. In Ophir the west crossdrift on the 1000-foot is in favorable ground. Work on the central tunnel level is the same as reported last week. In the upraise they ran into 2 inches of fair grade ore. Work is continued in crossdrift No. 2 1000-foot level in Mexican. Nothing new is reported. In Union they are still going east from the workings on the 900-foot level. No change is reported in the east crossdrift from the Layton tunnel level in Sierra Nevada. From both Utah and Andes nothing important comes to hand. The Best & Belcher and Gould & Curry joint east crossdrift 800-foot level Bonner shaft level is being driven slowly ahead. In Savage there is no change in the character of the work or material encountered. The official letter from Hale & Norcross reports repair work whenever needed

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.	Secretary.
Brunswick Con G M Co, Cal.	11	3c.	Mar 22.	Apr 23. May 15.	J Stadfeld
Channel Bend M Co, Cal.	7	2c.	Mar 22.	Apr 24. May 17.	J P Langhorne, 39 Sutter
Con Cal & Va M Co, Nev.	8	25c.	Mar 8.	Apr 13. May 3.	A W Havens, 309 Montgomery
Confidence S M Co, Nev.	28	30c.	Mar 12.	Apr 16. May 7.	A S Groth, 414 California
Crown Point G & S M Co, Nev.	70	20c.	Mar 24.	Apr 28. May 19.	James Newlands, Mills Building
East Best & Belcher, Nev.	5	15c.	Mar 25.	Apr 26. May 13.	E W Sichel, 337 Pine
Eureka Con D M Co, Cal.	8	5c.	Apr 2.	May 15. June 5.	D M Kent, 330 Pine
Golden State M Co, Idaho.	1	1½c.	Mar 29.	May 1. May 17.	E Logan, 101 Van Ness
Gould & Curry S M Co, Nev.	81	20c.	Apr 29.	June 1. June 22.	Alfred K Durbrow, 309 Montgomery
Gray Eagle M Co, Cal.	46	5c.	Mar 30.	May 8. May 29.	W J Gurnett, 308 Pine
Hale & Norcross S M Co, Nev.	111	10c.	Mar 20.	Apr 23. May 14.	R R Grayson, 331 Pine
Horseshoe Bar Con M Co, Cal.	7	10c.	Mar 8.	Apr 17. May 8.	D M Kent, 330 Pine
Jamison M Co.	9	5c.	Nov 27.	Apr 24. June 19.	Sam W Cheyney, 120 Sutter
Marguerite G M & M Co, Cal.	6	10c.	Apr 12.	May 24. June 21.	F Mettmann, 237 Twelfth
Overman S M Co, Nev.	77	10c.	Apr 12.	May 17. June 7.	Geo D Edwards, 414 California
Potosi M Co, Nev.	47	20c.	Mar 10.	Apr 14. May 5.	C E Elliott, 309 Montgomery
Savage M Co, Nev.	92	20c.	Apr 13.	May 17. June 7.	E B Holmes, 309 Montgomery
Seg Belcher & Mides Con M Co, Nev.	19	5c.	Apr 6.	May 10. May 29.	E B Holmes, 309 Montgomery
Sulphur Bank Q M Co, Cal.	5	25c.	Mar 23.	May 3. June 3.	T Wintringham, 306 California
Tenabo M & M Co., Nev.	1	50c.	Mar 29.	May 4. May 24.	T J Read, 606 Sutter
Thorpe M Co, Cal.	6	2½c.	Apr 14.	May 22. June 13.	A F Frey, Phelan Building
Union Con M Co, Cal.	1	10c.	Mar 18.	Apr 22. May 10.	J M Fletcher, 320 Sansome
Union Con S M Co, Nev.	54	20c.	Apr 7.	May 11. June 1.	A P Swain, 309 Montgomery

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and also exploiting from the 900-foot level workings. In a west crossdrift run from an upraise they struck a small vein assaying mostly silver. No work in Chollar is reported. In Potosi they are still drifting south and having each week a few tons of ore assaying over $20 to the ton. It is the opinion that considerable ore can be extracted when desired. In Bullion work is continued on the north drift, while in Alpha slow work is being done in driving the west crossdrift on the 500-foot level. The past week 20 feet was made in the Con. Imperial, Challenge and Confidence joint west crossdrift. The distance in is over 1100 feet. From Crown Point, Belcher and Seg. Belcher the same old reports, with slight variations, come to hand. The joint work that is being done by Kentuck, Yellow Jacket and Crown Point on the upper level ought to give good results later on. In Overman work is continued on the 900-foot level. A few tons of ore are raised each week. From Caledonia and Alta nothing new is at hand.

From the Brunswick lode our advices are of a fairly favorable character. In Occidental they are sinking from the 550-foot level. This winze will be met by a drift on the 650-foot level. They are running a west crossdrift on the 550 foot level. In Chollar they are placing in position a larger boiler so as to prosecute work on the 600-foot level. When completed a south drift will be started from the shaft on that level in Hale & Norcross ground. Work on the 200-foot, 300-foot, 400-foot and 500-foot levels is practically the same as reported last week. More ore is being extracted, raised and sent to mill. Last week 232 tons were milled, which gave to the ton a battery sample assay of $17.01 in gold and 16¼ ounces of silver. The work by Savage, Gould & Curry, Best & Belcher and Con. Virginia is about the same as reported last week.

The market opened strong and active this morning under buying orders from Virginia City. In the Pacific board Con. Virginia sold at $2.15, but in the San Francisco board it sold at $2. The rest of the list sympathized. After regular session the market weakened off, Con. Virginia closing at $1.90 at noon.. At the 2:30 session it sold down to $1.80, but was firmer after Call. In Crown Point they are running a west crossdrift from a raise from the 800-foot level. On the 600-foot level they are saving a little ore. In Savage they are working on the 500-foot, 750-foot and 850-foot levels. In the Brunswick lode ground they have suspended work until about the last of next week.

The following illustrates the changes of the week:

MINES.	Apr. 22.	Apr. 29.
Alpha		
Alta Consolidated	$	07
Andes		24
Belcher		39
Best & Belcher	$ 66	73
Bodie		
Bullion		08
Challenge		
Chollar	1 05	1 10
Confidence		1 15
Consolidated California and Virginia	1 80	2 00
Consolidated New York		03
Crown Point	12	34
Exchequer		
Gould & Curry	32	39
Hale & Norcross		90
Justice		
Mexican	48	52
Ophir	1 05	1 15
Overman		05
Potosi	55	66
Savage		23
Sierra Nevada	50	59
Union	26	27
Utah		
Yellow Jacket	27	28

San Francisco Stock Board Sales.

SAN FRANCISCO, April 29, 1897.

9:30 A. M. SESSION.

100	Alta	07	350	Mexican	52
100	Andes	24	400	N. G. & C	09
300	Belcher	39	200	Occidental	18
100	Best & Belcher	73	200	Ophir	1 15
500	Bullion	08	500	Overman	05
100	Chollar	1 10	1200	Potosi	66
550	Con Cal & Va	2 00	600	Savage	23
100	Confidence	1 15	500	Sierra Nevada	59
100	Con New York	03	500	Silver Hill	02
300	Crown Point	34	1150	Union	27
100	Gould & Curry	39	700	Yellow Jacket	28
150	H. & N	90			

SECOND SESSION—2:30 P. M.

100	Ophir	1 05	300	Sierra Nevada	51
100	Mexican	46	900	Union	25
1000	Gould & Curry	30	1200	Alta	06
100	Best & Belcher	67	100	Caledonia	13
575	Con Cal & Va	1 95	100	Occidental	18
100	Chollar	91	100	Yellow Jacket	28
100	Potosi	56	100	Andes	24

Rainfall and Temperature.

The following data for the week ending 5 P. M., April 28, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week	Total Seasonal Rainfall to Date	Total Seasonal Rainfall Last Year to Same Date	Average Seasonal Rainfall to Date	Maximum Temperature for the Week	Minimum Temperature for the Week
Eureka	.04	49.10	44.91	41.67	72	42
Red Bluff	.00	24.08	20.71	24.29	94	46
Sacramento						
San Francisco	.00	22.61	20.44	22.83	84	48
Fresno	.00	10.53	8.16	6.77	92	42
San Luis Obispo	.00	20.71	17.62		82	38
Los Angeles	.02	16.76	9.06	19.35	80	46
San Diego	.02	11.65	5.90	10.13	70	48
Yuma	T	5.35	.88	2.94	88	52

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THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from M. J. Williams and others, in the Galena Hill Mine, near Camptonville, Yuba Co., to deposit tailings in Eastman's Ravine; from Joseph Hustler, in the Hustler Mine No. 2, near Cherokee, Nevada Co., to deposit tailings in Shady Creek; and and from McGregor & Nix, in their mine near Cherokee, Butte Co., to deposit tailings behind the impounding works of the Spring Valley Mine, gives notice that a meeting will be held at room 59, Flood Building, San Francisco, Cal., on May 3, 1897, at 1:30 P. M.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Charles and Ben Howlett, in the Howlett claim, near Columbia Hill, Nevada Co., to deposit tailings in Knapp Ravine, and from the Marguerite Gravel and Quartz Mining Co., in the Marguerite Mine in Eureka Mining District, Nevada Co., to deposit tailings in a ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on May 10th, 1897, at 1:30 P. M.

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We have Eastern and foreign correspondents who are seeking good mining properties for investment. This Bureau will examine and report on mining properties in California, Nevada, Arizona, New and Old Mexico. Critical and accurate tests of ore made. Best references given. For any information, address DR. STEPHEN BOWERS, President; H. C. SIGLER, Secretary.

Assessment Notices.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 14th day of April, 1897, an assessment (No. 6) of .02½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 44 Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 22d day of May, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 14th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

SEG. BELCHER AND MIDES CONSOLIDATED Mining Company.—Location of principal place of business, San Francisco, California; location of works, Gold Hill Mining District, County of Storey, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 6th day of April, 1897, an assessment (No. 19) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, No. 309 Montgomery street, Room 50, Nevada block, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1897, will be delinquent, and advertised for sale at public auction, and, unless payment is made before, will be sold on SATURDAY, the 29th day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. B. HOLMES, Secretary.

Office—No. 309 Montgomery street, Room 50, Nevada block, San Francisco, California.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9), of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 26th day of March, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on SATURDAY, the 24th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 19th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of April, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on MONDAY, the 24th day of May, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 19th day of July, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

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MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 12th day of April, 1897, an assessment (No. 6) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of May, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 21st day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California. Office hours from 5 to 6 o'clock P. M. The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

GOULD & CURRY SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of April, 1897, an assessment (No. 81) of 50 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 69, Nevada Block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of June, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 22d day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED R. DURBROW, Secretary.

Office—Room 69, Nevada Block, No. 309 Montgomery street, San Francisco, California.

PROPOSALS FOR CANAL.

Sealed proposals will be received at the office of the Southern California Power Company, Redlands, California, until May 15, 1897, for the construction of 3¼ miles of canal, on the north side of Santa Ana river, from the mouth of Bear creek to the mouth of Keller creek, San Bernardino county, California.

The work is mostly through granite rock and consists of tunnels, flumes and trestles. Over two miles of the distance is through tunnels ranging from 100 to 1600 feet in length. There are twenty tunnels in all.

Contractors may bid on the whole or any part of the work. Plans and specifications can be seen at the office of the company, or they will be sent by mail upon application if desired. Satisfactory references must be given by bidders as to their responsibility, and as a guarantee that a contract would be entered into, providing the bid is accepted. The company reserves the right to reject any and all bids.

SOUTHERN CALIFORNIA POWER CO.

By HENRY FISHER, President.

Stockholders' Meeting Jamison Mining Co.

Notice of Annual Meeting of Stockholders of the Jamison Mining Company: In accordance with the by-laws of the company, the regular annual meeting of stockholders of the company will be held at 2 o'clock P. M. on MONDAY, the 3d of May, 1897, at the office of the company, rooms 50 and 54, 120 Sutter street, San Francisco, California.

By order of the President.

SAM W. CHEYNEY, Secretary.

Dated San Francisco, April 9, 1897.

STOCKHOLDERS' MEETING.—Notice of Stockholders' Meeting of the Steeple Rock Development Company: In accordance with a resolution passed by the Board of Directors of the Steeple Rock Development Company, a meeting of the stockholders of this company will be held at 3 o'clock in the afternoon on TUESDAY, the 11th day of May, 1897, at its principal office, No. 320 Sansome street, room 24, San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Million Dollars, in four hundred thousand shares, at the par value of five dollars each.

H. PICHOIR, Secretary.

Dated at San Francisco, Cal., March 26, 1897.

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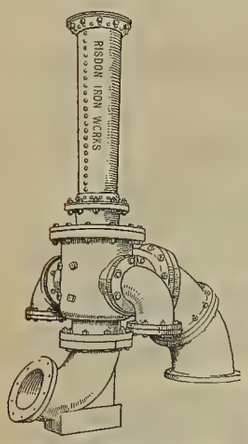
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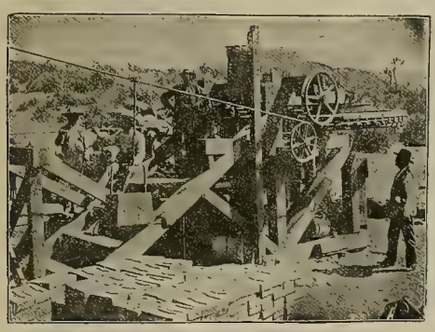
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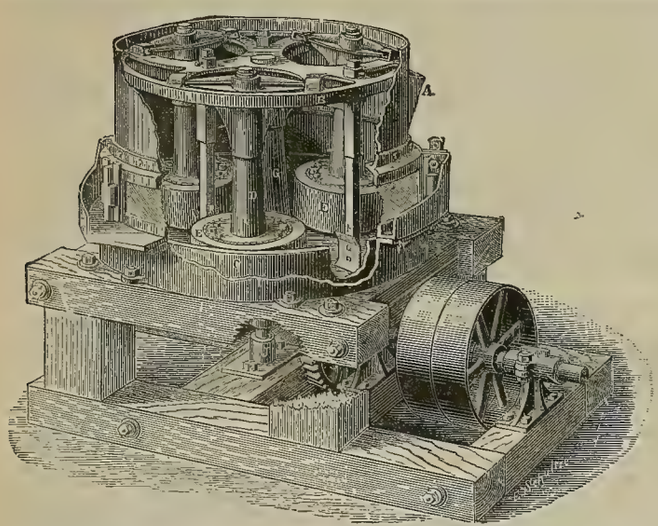
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Some Gravel Mining Methods.

Mining in California, both quartz and gravel, has given encouragement to invention in special lines. Probably more has been done for hydraulics than anything else that is of value to other industries. Here first the thin iron pipes came into general use for water under pressure. The necessities of the earlier hydraulic miner were such that he was compelled to resort to many devices that were new. Some stood the test, but many were partially or wholly failures. The sigmoidal wheel, which is such a valuable adjunct in hydraulics, is a California invention, and it is to be expected that with the use of the many supplies of water for generating electric power, as much advance will be made in the future as in the past.

In building up the present California system of hydraulic mining, now a standard the world over, from the use of the pan that would wash a yard of gravel in a day to the giants that will move 10,000 yards, many a plan for handling water was tested and found valuable or thrown aside as useless. Some, such as the use of the hose pipes, served their purpose for a time until supplemented by something better. Yet in a few small mines in the northern part of the State even to this day an old-fashioned canvas pipe may occasionally be seen. The rocker and pan are yet producing not a small proportion of the bullion yield of several counties.



STEAM SHOVEL AT HOLCOMB VALLEY MINE.

There was a time, particularly about the beginning of the second decade of gold mining in California, while most of the mining was confined to the low bars along the rivers, that many of the streams were lined with large current wheels used to raise water. Many hundreds of them were built along the Trinity, Salmon, Klamath and other streams, and the water, lifted to varying heights, was used for sluicing in the bars, and, in cases, for irrigation. Many such wheels are now in use in the streams that run through the arid but fertile country of Utah and Colorado.

In Siskiyou, on the Scott river, are some of these wheels, which are illustrated on this page. At W. T. Bennett's mine, at Oak Bar, three of these wheels are in place and furnish power for a pump and a hoist and raise water for sluicing. In this case the bedrock lies 22 feet below the river water level. In A. Brady's mine, at Scott Bar, the bedrock lies 16 feet below the water level, and a wing dam made of brush and earth encloses the mine. The gravel is handled by wheelbarrow. A dip wheel and a pump wheel are driven by the current of the river. Most of the material for making these wheels can be obtained in the neighborhood and at trifling cost.

The Holcomb Valley Mining Company's steam shovel, illustrated on this page, was built to meet other difficulties in handling gravel. This company—an English corporation—has been operating for several years in San Bernardino county, and has expended large sums in machinery and experimenting and prospecting. With the dredging machine or steam shovel fully 3000 feet of trench, averaging 16 feet wide and 18 feet deep, has been excavated. Water for sluicing was pumped from wells, but the quantity of gold in the gravel has been too small to make such expensive operations pay.



CURRENT WHEELS, BENNETT RIVER MINE.



CURRENT WHEELS, BRADY MINE, SCOTT RIVER.

Faith in Deep Sinking.

Much encouragement has been given to bolder ventures in the way of sinking shafts to great depths in California during the past year. Some weeks ago mention was made of the finding of larger bodies of good ore on the 2300-foot level of the Kennedy than had been found above. In the Gwin mine last week exceptionally rich rock was found on the 1300-foot level. In the Dead Horse ore in the lower levels is reported as good as ever found above, and preparations have been made to sink to 1700 feet. At a number of other large mines announcement has been made of intention to sink much deeper. In most of these mines the capital invested is local.

In the past California capital has sometimes lacked faith in the mines of the State and little was done to show what was below the surface. The whole State has been scoured over to discover mines without sinking. But now an era of deep mining in California is promised and, what is best, it will be inaugurated largely by local capital. Soon many of the deep shafts now sinking as ventures will develop big mines.

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TO THE PUBLIC.

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San Francisco, May 8, 1897.

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The Denver Convention.

The committee appointed by the commercial bodies of Denver, Colorado, have decided to call the International Congress of Gold Miners to meet in that city July 8th, 9th and 10th. According to press dispatches, it has been decided to divide the meeting into two classes, partaking of a convention, and an exposition for the display of methods and processes that are of value to the working miner.

The basis of representation decided upon is thirty delegates at large from each State and Territory, to be appointed by the Governor, five from each county, five from each city, and one additional for each 1000 or fraction thereof. Properly managed and with good representation from the different States, the convention can do much good. It is to be hoped that the promotion element will not predominate. While advertising is a good thing, even in mining, it must be remembered that there are a number of mine owners in these Western States who do not consider it their only object in life to sell out. The educational features should be given due consideration, and, if that is done, the future conventions proposed will be better attended. It is to be hoped that California will be well represented.

The New Mining Law and District Recorders.

Secretary Sonntag of the California Miners' Association received last week from E. B. Maginnis, District Recorder of the Rand district, California, a letter asking for information as to the new mining law, as follows:

There are so many interpretations of the new mining law, to make it clear to myself and the miners here, will you kindly answer the following questions:

When does it take effect? When am I to turn over my books to the County Recorder? How about turning over books in thirty days, when law does not take effect until sixty days? The Rand district is in Kern and San Bernardino counties—to which County Recorder am I supposed to deliver my books? When shall I stop receiving location notices? If the books have to be segregated, where shall it be done and who shall pay for it?

Curtiss H. Lindley, of the Committee on Legislation of the California Miners' Association, in response to a request from Mr. Sonntag in the matter, writes as follows:

1. The act was approved March 27, 1897, and it takes effect at midnight of May 25th. No records made on or after May 26th in the district recorder's office will be valid.

2. The time within which the district recorder is required to turn over the books to the county recorder commences to run from the date the act "takes effect," which is equivalent to its "passage" in a legal sense. In other words, the district recorder should turn over his books to the county recorder on or before June 25th.

3. As Rand district lies partly in Kern county and partly in San Bernardino, I think the law will be satisfied by depositing the records with either county recorder, suggesting the one where the district recorder's office is situated, although this is merely a suggestion.

4. There is no law authorizing the records to be duplicated or segregated. The county recorder in whose custody the books are placed would be the lawful custodian and could issue certified copies although the location in question might be in another county. I do not see any serious difficulty in the situation at all as the deposit of the records with either county recorder will make them accessible and fix a legal depository.

The Increasing Gold Yield.

There can now be little doubt that the yield of gold for 1897 will show a considerably greater increase than did that of 1896. Last year the bulk of the increase in the yield over 1895 came from the United States. There were many things that tended to keep down the product last year, such as the Transvaal raid and subsequent troubles, the slump in West Australia and the fire in Cripple Creek. So far in 1897 nothing has happened in any part of the world to disturb the industry, and nothing is likely to occur, except it be trouble between the British and the Boer governments. Up to the end of March the yield of the Rand was 652,898 ounces, against 489,178 ounces for the first three months of 1896. If this rate is kept up to the end of the year, there will be an increase in the yield of the Rand alone of over $6,000,000. Whatever the disturbances, the yield cannot well be less than that of 1896.

Of all the gold fields of the world the Rand is the most uncertain in spite of the fact that the extent and value of its ore bodies are comparatively best known; and until the questions between the Uitlanders and Boers, particularly as to monopolies, are settled, and until it is decided who shall rule the Rand, the gold yield cannot be counted on with certainty. While under present conditions it is likely that more mines will be closed down, there are enough large properties being exploited, and upon which large mills will be erected within the next year or two to very largely increase the total yield. The Rand Mines, Limited, a company organized by the Exploration Company of London, controls, through subsidiary companies, nearly 1700 claims being developed, and upon which, up to the end of 1896, £2,226,102 had been expended. Upon only one mine has a mill been erected, but by March, 1898, there will be dropping on their properties 710 stamps according to present plans, and eventually 1300 altogether. While Africa will not do to conjure with on the London stock market, she will still be heard from for many years as a producer of bullion.

In the Australian colonies there is shown a healthy increase in the returns and everything tends toward still better reports before the end of the year. The product of the Bendigo district for the first eleven weeks of 1897 shows an increase over the corresponding period of 1896 of 4200 ounces.

The Russian output can hardly fail to show some increase, for considerably more interest is being taken in the gravels of Siberia and the Urals than before by representatives of foreign capital, and it is predicted that with the introduction of improved methods Siberian gold fields will make a wonderful showing. As it is, the crude methods of working the gravel are proof of their richness.

Into British Columbia a large amount of machinery is being shipped. This says more for that district than the sale of the War Eagle for nearly a million dollars, or the offer of a million pounds sterling for the Le Roi. The increase of the yield of precious metals in the Kootenay country has been steady and has not been forced by factitious methods caused by speculations or over capitalization such as has been the case in western Australia and South Africa.

In Colorado, at Cripple Creek there has been a very large increase; the superintendent of the Denver mint says that in January, February and March there was produced in all Colorado no less than 20 per cent more than during the corresponding period of 1896.

In California there can be little question as to the future. Conditions prevent much speculation and the amount of development work being done on business lines promise a continual healthy growth in the output.

If there shall be no troubles in Africa nor a European war the world's yield of gold for 1897 should exceed that of 1896 by $20,000,000 at least.

An Important Question.

At a recent meeting of the Executive Committee of the California Mines Association a committee was appointed to take action toward securing from Congress a further appropriation of $600,000 for impounding debris and the Anti-Debris Association was asked to name a similar committee to co-operate. The miners did so much in the last legislature for the drainage bill that it appeared then as if an era of good feeling between the miners and the farmers was being inaugurated, and that the two interests would in future act in harmony for the common good. However, in answer to the notification of the Executive Committee of the Miners' Association, the Anti-Debris Association state that they have been unable to get a meeting together to appoint the committee suggested. Meanwhile the Sacramento Board of Supervisors are causing the arrest of miners charged with operating illegally. There can be no objection to any just effort against anyone who violates the law, but the Federal statutes provide that such steps may be taken through the California Debris Commission. This body is disinterested and will see that the laws are enforced. Steps are being taken against ground sluicing, which is allowed under the present laws. This question would better be brought up in other shape. If it is proposed to make an attempt to hamper sluice, drift and quartz mining, as well as hydraulic, there will be arrayed with the hydraulic miners interests that will be heard.

The Board of Trade in Nevada City, Cal., issues a warning in resolutions adopted last week that should be given heed by the good people of Sacramento. They are in part as follows:

For years the mining interests of Nevada county were involved in litigation with the people of the valleys, resulting in decisions of the courts which have stopped hydraulic mining. And though such litigation proved of great injury to this county, said decisions have been respected in good faith by the miners of Nevada county.

And though said litigation separated for a time the business interests of Nevada county and Sacramento, yet in recent years the business interests of the two sections have been closely allied, old scores have been forgotten and harmony has existed, which was shown and may well be remembered, that in the recent session of the Legislature the representatives of the mountains came to the assistance of the valleys to pass the Dredger bill.

For years the people of Nevada county have been given the assurance by the representatives of the valleys that the litigation of the past was directed solely against hydraulic mining, and that no attempt would ever be made to interfere with any other kind of mining, either quartz, drift or placer; yet in the face of these promises made by the people of the valleys and accepted in good faith by the people of Nevada county, who have resumed their business relations with Sacramento, the supervisors of Sacramento county have brought suit in the Superior Court of Sacramento county against respected citizens of Nevada county and obtained a temporary injunction against them from mining by ground sluicing.

That we recognize in this suit which has been brought by the Supervisors of Sacramento county against citizens of Nevada county, a new departure in litigation, involving methods of mining which are perfectly legitimate and allowed by the State and National Government. This new issue involves all classes of mining, both quartz and drift, as well as placer mining, to which it is now directed, striking at the very foundation of the mining interests of Nevada county. And recognizing as we do, the decisions of the courts against hydraulic mining, we will not submit without a struggle, to a new step being taken to crush our mining interests, and will do everything in our power to protect them.

And be it further resolved: That in the citizens of Sacramento we recognize people who are and should be our friends, with whom we have close relations in business, which this litigation threatens to sever. That we do not believe that the people of Sacramento endorse or in any way support the action of the Sacramento Supervisors in bringing this action, believing that their action was induced solely at the instigation of well-known agitators who have for years made money out of both valley and mountains by stirring up litigation. And it is no more than right that we look to the conservative business men of Sacramento, to protect their own business interests, by protecting ours.

Concentrates.

BAKER CITY, Or., wants a U. S. assay office and should have it.

DURING April, 1897, local corporations paid $749,041 in dividends; $728,306 last April.

A COMPANY organized in Pittsburg, Pa., is preparing to work sulphur deposits in Lower California.

THE total production of copper in the world for 1896 is estimated at 370,000 tons, against 334,105 tons in 1895.

THE tariff bill being passed by the Canadian government provides for the admission of mining machinery free.

ANOTHER addition is being put in the De Lamar mill in Nevada, for more cyanide tanks which will increase the capacity to 500 tons daily.

THE railroad now building from Oakdale, Stanislaus Co., Cal., into Amador Co. will, it is expected, be ultimately extended to Mariposa Co.

THE Elkton Mining Company, of Cripple Creek, Colo., has invested part of its surplus funds in United States bonds of the face value of $100,000.

THE steamship Lahn, New York to Bremen, on the 4th took $1,500,000 in gold; the St. Paul, New York to London, on the 5th took 515,000 ounces of silver.

LAST week fifteen sacks of ore from the Anchoria-Leyland mine at Cripple Creek, Colorado, were shipped to Denver by express because of its high value.

THE Hampton Plains Estate Company in western Australia has offered a reward of £10,000 for the discovery of a payable reef on block 45, Hampton Plains.

IT is stated that work will commence in a few days on the proposed railroad from Kramer to Randsburg, Cal., and that it will probably be in operation by August 1st.

THE government statistics of the German Empire for 1896, show the following production in tons: Coal, 85,039,861; brown coal, 26,797,880; iron ore, 14,162,315; pig iron, 6,295,272.

THE Hall mines smelter at Nelson, B. C., is being enlarged to treat 380 tons of ore daily. A new blast furnace with a capacity of 250 tons daily has just been completed.

THE new shaft in the Utica mine at Angels Camp, California, for which ground was broken December 18th last, was down to a depth of 600 feet on the first of this month.

FARRON AND STAHLMAN of Salt Lake, who are developing the Adelaide copper mines at Golconda, Nevada, have been arranging for a site for a smelter it is proposed to erect there.

IN the tariff bill as presented to the Senate the duty on lead in ore is increased from one to 1½ cents a pound. The duty on quicksilver is reduced from ten to five cents a pound.

IT is thought that, when completed, the United Verde Copper Company's smelter at Jerome, Arizona, will be the second largest producer in America, the Anaconda of Butte, Montana, being the largest.

THE amendment to the mining laws of British Columbia, providing that aliens may not take up claims, has been passed by the legislature at Victoria. This does not apply to foreign companies, however.

THE cyanide-chlorination plants treating Cripple Creek, Colorado, ores are handling 500 to 600 tons daily and when the new mills being built are completed their capacity will be about 1000 tons to handle low grade ores.

CARDWELL AND BEMIS, who are interested in the development of the Meadow Lake mines, are asking the people of Truckee, Cal., to contribute toward building a road from that place, over which to transport the ore.

THE returns of gold bars received at the United States branch mint in Denver for the first three months of this year show a total valuation of $1,556,294.57, the largest quarter's business ever done there by some $500,000.

IN the down town and Carbonate hill basins at Leadville, Colo., which it is proposed to drain by tunnel, it is estimated that from 1891 to the turn of the strike in 1896, no less than 5000 gallons of water per minute were pumped.

THE coal production of Hungary amounted in 1896 to 4,970,000 tons, as compared with 4,651,400 tons in the previous year. The imports amounted to 1,701,800 tons, so that the total coal consumption of the kingdom was about 6,500,000 tons.

MORSE B. DAVIS, I. M. Jacobs and A. Binnard last week organized the Montana Smelter Company, for the purpose of constructing a smelter at Twin Bridges, for which twenty-five acres of land have been given by citizens of that place.

IN the Bendigo District, Victoria, Australia, the gold output from January 1st to March 6th of this year, is reported at 31,939 ounces against 30,423 ounces for the same period in 1896. The dividends paid from January 1st to March 6, 1897, amounted to £18,519.

LAST week no less than thirty-five locations of mining claims were recorded in Calaveras county. Until the new mining law goes into effect—May 26th—there will be an unusually large number of locations, many to avoid the $50 assessment work.

ALEXANDER BURRELL, the new manager of the Drum Lummon mine in Montana, announces that the 50-stamp mill will be started up again in a few days. The cyanide plant to work the tailings, with a capacity of 400 tons daily, will be finished in two months.

THE British Columbia Legislature has passed an act forbidding the employment of Chinese or Japanese underground, under penalty. Many mining towns in Kootenay have forbidden Orientals to cross their boundaries, and many have been sent back with threats.

THE Alaska-Mexican (Alaska) reports for March as follows: Period since last return, thirty-one days. Bullion shipment, $27,485; ore milled, 12,036 tons; sulphurets treated, 344 tons. Of bullion there came from sulphurets $12,817. Working expenses for period, $28,803.

THE report of the Rio Tinto Copper Company of Spain, shows that in 1896 the pyrites produced amounted to 1,437,332 tons, and the average copper contents somewhat above that of the previous year. The copper production at the mine was 34,501 tons, and the copper sales 30,685 tons.

A SECOND mining stock exchange has been formed at Spokane, Wash., under the name of the Spokane Board of Trade and Stock Exchange. It is proposed that mines listed shall be designated as "shipping" mines, "prospective" mines, or "prospects," according to their condition.

THE first regular mail service authorized for an entire year in Alaska has been contracted for by the Postoffice Department, the service being from Juneau to Circle City, 900 miles each way. The contract calls for one round trip a month, beginning July 1st, '97. The contract price is $7000.

AN English syndicate has purchased the Winnamuck Mining Company's property at Bingham, and have paid down $50,100 of the purchase price. This mine produced very large profits up to 1889, when the vein was lost. During the past year new men took hold and discovered large bodies of good ore.

THE cyanide plant being built by McCone, Woodbury & Cain at the Eureka mill, on the Comstock, will have a daily capacity of 130 tons. It is designed to work the tailings they have purchased, known as the Eureka mill tailings, Morgan mill tailings and those of the Nevada or Chollar mill, aggregating about 70,000 tons.

AT Winnemucca, Nevada, there arrived last week several teams with wagon loads of borax from southeastern Oregon, about 150 miles away. The teams will make regular trips from now on, and by taking freight for the northern country on the return trip will in a measure revive the old-time freighting business from Winnemucca.

THE United States Government has let a contract for a monthly mail service to the Yukon gold fields and application has been made to the Canadian Government at Ottawa to open up a service by the White pass at the head of Lynn canal. This would necessitate the building of a trail which, it is claimed, would be of value to the miners.

THE gold output of the Rand, South Africa, for the month of March was 232,066 ounces. This shows an increase of 21,066 ounces, as compared with the previous month's total, and an increase of 58,114 ounces, as compared with the corresponding month of last year. The output is a record one, exceeding last August's record by no less than 18,648 ounces.

THE Denver & Rio Grande people propose to build a spur railroad from the Leadville city freight yards to the mines, tapping all the large producers. When this announcement was made last week a vigorous protest was made by the owners and drivers of wagons which have been hauling the ores, and a committee was sent to Denver to ask the railroad people to reconsider.

IT is curious that $200,000 a ton is the favorite value put on ore in rich strikes all over the country this season. Below this the next figure is $20,000 and then comes $10,000, but no strikes are ever recorded of ore worth any sum between $20,000 and $200,000. A ton may contain nearly $600,000 worth of gold, if pure enough, and this gives a large field for changes in styles of stories.

THE tendency of the times is strikingly illustrated in the case of A. T. Hatch, till recently the greatest fruit grower in the great fruit growing State of California. About four months ago he failed, and recognizing the general trend of affairs immediately started on a prospecting tour, returning to this city last week. He hopes now to make another fortune in California mines.

THE British Columbia Legislature has passed an act excluding United States citizens from taking up mining claims in British Columbia. The act reads that no one shall be entitled to a free miner's license enabling him to locate precious metal claims unless he is eighteen years of age or over and is born a British subject, or unless he files a declaration of intention to become a British subject.

IN spite of all the newer and more advanced methods that are coming in, it is refreshing to note that the old styles of mining still hold sway in places and are adopted even by big companies. Last week the Reservation Star Gold Mining Company, owners of property in the Pierre's Lake district, in Idaho, sent up to their mines a force consisting of a man, a dog and a double-barreled shotgun to begin operations.

THE Elkhorn mine in Montana, owned by English people, has been for some time considered about worked out. The report for the past thirteen months shows that the mine produced during that period $411,945. Of this there was paid for wages and other expenses at Elkhorn $295,930; the output was 13,830 tons, and was treated in the Elkhorn mills. The mill product was 486,721 ounces silver and 340 ounces gold.

MANAGER D. B. HUNTLEY of the De Lamar (Idaho) mine reports for March as follows: Crushed during the month, 4420 tons. Bullion produced in the mill, $49,675; estimated value of ore shipped to smelters, $2628; miscellaneous revenue, $125; total produce, $52,428; total expenses, $38,678; profit for the month of March, $13,750; bullion and ore on hand and in transit, being result of general cleanup for the year, $10,085; total, $23,835.

SOME of the people of British Columbia are protesting against granting the request of the Duke of Teck Chartered Company to be allowed to administer the government of the Yukon country in Canada, after the manner of the British Chartered companies in other parts of the world. It is claimed that the people going into that country are capable of setting up a local government and managing their own affairs as loyal subjects of the Queen.

SINCE speculation and overcapitalization are dying out in mining, more interest is being taken in the expenditure of money in genuine development work. This most encouraging sign for the mines of the western part of the United States is the fact that so much money is being paid out for machinery, for that is the best indication that ore bodies worth working are being discovered and developed in greater quantities than for many years past.

THE Caledonia mine of Cripple Creek, sold by Mr. Stratton a short time ago for $50,000, and which has not been improved since, has been placed on the London market as the "Caledonia (Cripple Creek) Gold Mine, Limited," at £125,000 or $650,000. It is a very healthy sign for the future of legitimate mining in Colorado that this and similar schemes are being exposed whenever they appear by the newspapers of that State. The *Mining Investor* says that it is absurd to suppose that the mine is worth anything like what it is offered for.

ON April 16th a meeting of representatives of all the mining groups was convened at Johannesburg to consider a petition to be presented to the Volksraad on affairs of gold mining industry. The petition refers to the questions of railways, the dynamite monopoly, the Liquor law, thefts of gold, native labor, and other subjects. The industry has now united, and has formed a committee to deal with all questions in their entirety. On this committee both the Mining Chambers and the whole of the industry are represented. It was decided to agitate on constitutional lines with a view to obtaining a reduction of freight tariffs and of customs duties.

IN the Boss Tweed mine, at Mammoth, Utah, last week, a 4-foot ledge of ore, assaying 50 per cent bismuth, is reported to have been discovered. Of this the Eureka *Democrat* says: "About 500 pounds of float has also been discovered in West Tintic, which runs 43 per cent bismuth and 42 ounces in silver. A party will leave in a few days for the scene for the purpose of locating the ledge. There is no plant in the United States that can work this metal, and interested parties are now corresponding with the Welsh works at Swansea, with a view to securing a market. It is estimated that ore which carries 50 per cent bismuth is worth at least $2400 a ton."

THE report of the Franklin Mining Company of Michigan for 1896 shows that the mine produced 3,367,218 pounds mineral, which yielded 81.55 per cent, or 2,746,076 pounds fine copper. There were 135,156 tons rock hoisted and 122,079 tons rock stamped, the yield being 1.38 per cent, or 27.58 pounds mineral per ton stamped. The amount of mass and barrel work was 961,930 pounds. The total receipts were: For copper, $307,356; interest, $92; total, $307,448. Expenditures were: For running expenses at mine, $246,893; smelting, freight, insurance, etc., $39,897; total, $286,790, leaving a balance of $20,658. The average receipt per pound of copper was 11.19c.; mining expenses, 8.99c.; other expenses, 1.45c.; total, 10.44c., showing a surplus of 0.75c. per pound.

IN British Columbia the railways are getting very large subsidies not only in money but in agricultural land, and now comes Premier Turner proposing to grant to the Cassiar Central Railway all minerals in the land granted to it, whereupon there is considerable protest made. The Premier announces that the district is difficult of access, and by his Railway bill he places free miners in this position: They must conform to the mining laws of the province; they must give the railway company a one-half interest in any mineral property they discover within the railway belt; they must pay a royalty of 1½ per cent upon the net returns; they must pay $50 per annum for each claim held by them and $100 for every transfer of a mining claim; they must pay 50 cents per thousand for all milling timber used and 25 cents per cord for all cordwood used.

THE following figures of production for California for 1896 have been issued by the State Mineralogist: Gold, 831,251 fine ozs., $17,181,962; silver (coinage value, $422,468), commercial value, $219,123; chrome iron, 786 tons, $7775; mineral paint, 395 tons, $3500; antimony, 55 tons, $2300; manganese, 318 tons, $3400; magnesite, 1500 tons, $11,000; asphaltum, 19,000 tons, $62,000; marble, 7889 cu. ft., $32,500; sandstone, 58,000 cu. ft., $28,300; granite, 185,000 cu. ft., $278,000; lime, 20,275 bbls., $152,000; quicksilver, 30,000 flks, $1,020,000; copper, 1,992,287 lbs., $209,190; lead, 1,293,500 lbs., $33,571; platinum, 150 ozs., $2250; borax, 13,606,890 lbs., $680,345; coal, 69,449 tons, $158,135; gypsum, 1300 tons, $13,000; petroleum, 1,242,860 bbls., $1,242,860; slate, 500 squares, $3500; cement, 9500 bbls, $28,500; bituminous rock, 37,000 tons, $101,750; salt, 45,300 tons, $90,600.

IN this country, where there is not even a bureau of mines supported by the Federal Government, and the industry hardly recognized officially, it will be interesting to read the following item from the Australian *Mining Standard*: "It is gratifying to note that the Governments of Victoria and New South Wales have found no difficulty in federating over a homely matter of prospecting on the border near Cape Howe. Each Government has a party in the field, and the results are described as encouraging, so encouraging, in fact, that one of the most obvious difficulties which beset this form of State aid to industry has already cropped up. Some members of the prospecting party, to-wit, are making applications for the blocks they have helped to discover, and the problem as to who is to get the first benefit of the 'find' threatens to become a knotty one."

THE report of the Alaska-Mexican for 1896 shows that the total receipts from ore worked were $245,862; the expenses were $184,212, leaving a net balance of $61,850. To this is to be added $26,227 balance from previous year, making a total of $87,877. Dividends paid were $72,000, or 8 per cent on the stock, leaving a balance of $15,877 at the close of the year. Of the bullion obtained, $76,330, or about 31 per cent, was from sulphurets collected by concentration and treated by chlorination. The total quantity of ore taken out and milled during the year was 101,702 tons, and 1290 tons of waste rock were moved. The total development work amounted to 2395 feet. In drifting 500 feet on the vein, samples taken from every blast gave an average assay of $3.21 per ton. A large number of samples taken from faces of drifts gave an average of $4.74 per ton. The estimate of ore in sight at the end of the year is 607,266 tons, or over five years' supply for the mill.

THE Elk City country, on the western slope of Bitter Root divide, in Idaho, opened in 1860, produced a large amount of gold from placers. For the ten years between 1880 and 1890 the district was occupied almost exclusively by Chinese, who worked over the old diggings. About 1887 some white men from Cœur d'Alene entered the camp, jumped the best of the ground owned and worked by the Chinese, and took the matter into the courts. Judge Sweet in 1889 decided that aliens could not hold mining ground under the United States mining laws, and there was soon after a general exodus of Celestials from the mining camps on both sides of the Clearwater. Their places, however, were speedily filled by white people, and the result has been distinctly beneficial to that section. Syndicates of Chicago and Butte people have taken hold of some of the best of the old placer claims and are developing the ancient channel of American river. Many a placer claim in California is now worked by Chinese who could not hold possession.

SOME amendments to the new mining law of British Columbia, as finally reported, are as follows: The employment of females or children underground is prohibited. Chinese or Japanese may not be employed underground nor in caring for machinery. No wages must be paid to employes in or near places where liquor is sold. On or before January 16th of each year returns must be sent to the Bureau of Mines for the year of the output of mines and other information that may be required. Provisions are made for inquiry into accidents in mines and general rules are made for proper ventilation and to prevent the storage of explosives in mines. Each mine is to have a suitable device for thawing explosives and iron tamping rods are forbidden. Every working vertical shaft in which persons are hoisted or lowered, if over 300 feet deep, must have a safety cage and guides. Mine owners must assume the responsibility of lowering or hoisting men, or must prohibit it positively. Provisions are also made for proper timbering, ladderways, etc., and penalties are imposed for infraction of the regulations.

Practical Notes on Hydraulic Mining.*

NUMBER V.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE H. EVANS, C.E., M.E., General Manager Cons. G. Mines of Cal., Ld. Oroville, Cal.

Friction in Pipes.—This is a most important matter to those who are connected in any way with mining or other enterprises in which water is used under pressure, and very few miners are conversant with the principles relating to friction of water in pipes, etc. Most people connected with water supply have a knowledge of the fact that when large quantities of water are discharged from pipes of small diameter the pressure is greatly reduced, but few know how to arrive at a correct method of finding out the exact loss due to friction. Were it otherwise there would not be in evidence so many palpable blunders in the construction of pipe lines used for hydraulic mining and other purposes, and in many instances success would be the rule in place of failures, many of which are due entirely to errors made in bringing the water supply to the claim, and laying down pipes of too small diameter, thus reducing the effective head or pressure (in instances I have known) to less than one-half that available with pipe lines properly proportioned.

In a previous paragraph I stated that water flowing through pipes should not exceed 3 feet per second, or 180 feet per minute, and if all users of water for hydraulic mining or power purposes had their pipes of the correct diameter to insure a velocity not exceeding that named above there would be very little trouble, as both efficiency of water and economy in construction of pipe line would be attained.

It must be understood that the friction of water in pipes increases as the square of the velocity, and also depends upon the condition of the pipes—whether they are foul and rusty, or are new, or in good condition. Even the rivet heads in a pipe line of considerable length cause a good deal of friction and consequently loss of head.

There are several formulæ for determining the friction in pipes, but most all of them are difficult and too complex for ordinary miners. But Mr. William Cox, has simplified Weisbach's formula, and yet gives identical results. Besides it is easy to work out. It is as follows:

$H = \frac{L}{1200d} \times (4 \times V^2 + 5\ V - 2)$ when H = friction head in feet. d = diameter of pipe in inches. L = length of pipe in feet, and v = velocity of water in feet per second.

Example.—What is the loss in head of a pipe line discharging 400 miners' inches or 600 cubic feet per minute, diameter of pipe being 12 inches, and length of line 5,000 feet. We must first find the velocity in feet per second, and to do this we use a simple formula, given in remarks on velocity of water through pipes, in a previous paragraph, viz: Multiply number of cubic feet of water discharged per minute by 144 and divide the product by the diameter of the pipe in inches. Therefore in this case, velocity = $600 \times 144 \div 113.10$ the area in inches, or 763.9 feet per minute or 12.73 feet per second.

Now knowing the velocity, diameter and length, we will find H or friction head as follows:

$$H = \frac{L}{1200d} (4\ V^2 + 5\ V - 2)$$

$$\frac{L}{1200d} = \frac{5000}{12 \times 1200} = .3472$$

$4 \times 12.73^2 + 5 \times 12.73 - 2 = 709.86$ and this $\times .3472 = 246.44$ feet or friction head.

That is to say, if we had in this example a fall of 500 feet, and constructed a pipe line with pipes 12 inches in diameter, having a total length of 5,000 feet, our actual head of 500 feet would be reduced to $500 - 246.44$ or 253.56 feet, or putting it more plainly, we would have a pressure of 110 pounds to the square inch instead of 217 pounds, and this loss is due entirely to using pipes of too small a diameter.

Another formula I use, and which gives clear results, is as follows: $H = \frac{plcv^2}{2ga}$.

H=loss of head by friction in each 100 feet of pipe.

p=the perimeter, or circumference of the pipe in feet.

l=100 feet.

c=a variable coefficient from .00406 to .01338, according to the nature of the pipe, and velocity of water.

v=velocity of water in feet per second.

g=the acceleration of gravity, or 32.2 feet.

a=the sectional area of pipe in feet.

Example: A pipe line 5000 feet in length, of newly-riveted pipe, 20 inches in diameter, with a head of 650 feet between the supply and discharge ends, and delivering 400 miners' inches of water, what is the loss of head?

First determine the velocity, which is 4.58 feet per second, then $H = \frac{p \quad l \quad c \quad v^2}{2 \times 32.2 \times 2.181} = \frac{5.235 \times 100 \times .00506 \times 20.9}{140.456} = \frac{55.372}{140.456} =$ .394 feet, or .394 feet loss for each 100 feet of line, and there being 5000 feet of pipe, the loss will be $5000 \div 100 \times .394$, 19.70 feet, and the actual pressure head would in this case be 650 feet, less 19.70 feet frictional head, or 630.30 feet.

It is well to remember that it makes no difference whether the water is flowing up hill or down, or whether the pressure is great or small, the total friction will be materially the same, and that in wooden pipes the friction is nearly double that of iron or steel.

Loss of Head Due to Bends and Angles.—This loss is also an important one, and in many instances is great, owing to the number of sharp bends or changes in the direction of a line of pipe, carrying water for mining, or other purposes. In a pipe line there should be no bends having a radius of less than five diameters.

To calculate the loss of head due to the resistance of a right angle bend, the simplest rule is to obtain the velocity of water flowing in feet per second due to the head, and multiply the square of such velocity by .0152. For example: What is the loss of head due to the resistance of a 90 degree elbow, with water flowing at a velocity of 15 feet per second? Answer: $15^2 \times .0152$, or 3.42 feet.

Where the radius of the bend is greater, or more than five diameters, the head required to overcome the resistance can be found by multiplying the square of the velocity in feet per second by the number of degrees in the angle, and dividing the product by 88489. For example: Velocity 10 feet per second, what is the resistance of a bend having an angle of 120°? Answer: $\frac{V^2 \times 120}{88489} = .135$ feet.

When the radius is less than five diameters, the resistance would be as per following rule: Mean velocity squared, divided by 64.4 multiplied by the square of half the angle of deflection, multiplied by 2.06 times the 4th power of the same angle.

For fairly accurate results, this formula may be simplified by multiplying the square of the velocity in feet per second by C, C being equal to the following co-efficients for the various angles, viz:

C=.000109 for angle of 10 degrees.
C=.000466 " " " 20 "
C=.001134 " " " 30 "
C=.002158 " " " 40 "
C=.003634 " " " 50 "
C=.005652 " " " 60 "
C=.008276 " " " 70 "
C=.011491 " " " 80 "
C=.015248 " " " 90 "

(To be Continued.)

AT the present price of about 32 cents a pound, aluminum is cheaper than the same bulk of copper or brass. Yet 100 pounds of brass, or 250 of copper, are sold to one of aluminum. Manufacturers of the new metal disposed of 650 tons of it last year, but they are compelled to discover its novel uses. Aluminum has nearly displaced nickel in the arts, and it is in growing demand for cooking utensils, bicycle parts, plates for false teeth, handles for surgical instruments, a substitute for lithographic stones, non-magnetic electric apparatus and military accoutrements. Its lightness renders it peculiarly suitable for canteens, buttons and belt plates.

The Copper Queen Property, Arizona.

Bisbee is the seat of operations of the Copper Queen Consolidated Mining Company, in Cochise county, in the Mule mountains, thirty miles south of Tombstone and fifty-six miles southeasterly from Benson. It is within seven miles of the Mexican border. The mountains here are lofty, but not rugged, with a scant growth of timber. As shown in the accompanying illustration, the town occupies a position in a gulch, with less room than there is at Deadwood, South Dakota. The property of the Copper Queen takes up the entire slope of the mountain, on the south side of the gulch, extending for more than a mile along the trend of the mountain. The ore deposits follow the alignment of the gulch, the original discoveries having been made from out-croppings at the surface, at a point above the present location of the town. While the belt of copper ore appears to have a well-defined trend, the ore bodies seem to be irregularly formed, widening out into an immense pocket in one place, then narrowing down to a vertical vein in another.

The underground workings consist of two main shafts, 400 feet and 500 feet deep, respectively, from which levels have been run at each 100 feet, with very extensive stoping from each level. Within the various drifts and levels there are about forty miles of ore-car trackage. The two main hoisting plants handle 500 tons of ore each twenty-four hours.



BISBEE, ARIZONA, SHOWING PARTIAL VIEW OF COPPER QUEEN PROPERTY.

The smelting and reduction plant, which partially appears in the illustration, consists of three blast furnaces in operation, three copper converters and three revolving roasters. In the engine room are five engines, aggregating over 1000 H. P., operating the air drills, furnaces, converters and other machinery. A new upright engine is being put in to operate the converters. In the converting department the material is handled by hydraulic cars, instead of cranes.

A large percentage of the ores thus far has been partially oxydized, but at lower depths they become sulphides, which require some roasting. As both oxydized and sulphide ores are being produced, they are mixed in such a proportion as to produce about a 45 per cent matte, which yields to the converting process without roasting. The company makes use of the revolving roasters to some extent to desulphurize the more refractory sulphide ores. The average ore values, as they are mixed and smelted, run about 8 per cent copper, and the product of the converters is a copper bullion which is over 99 per cent pure copper. The product of the property, as now operating, is about two million pounds of copper per month.

The Arizona & Southeastern railroad, which runs from Benson to Bisbee, connects with the Southern Pacific at Benson and with the Nogales & Guaymas line at Fairbanks. While this road is operated separately, the stock therein is owned by the Copper Queen Company.

As an example of the liberal spirit which characterizes the Copper Queen management, it may be cited that it maintains an excellent free library for the use of the employes, as well as a well regulated hospital. The public school building of Bisbee, with

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grounds, was donated to the town by the company.

Messrs. Dodge and James, large stockholders in the Copper Queen Consolidated Company, who have long been heavy shareholders in the well known Detroit copper property at Morenci, near Clifton, have recently acquired possession of the remainder of the stock in the latter property.

At the Copper Queen property over 1000 men are on the company's pay-rolls, though a smaller number than this is constantly employed.

Adjoining the Copper Queen properties on the north are the fifteen claims of the Copper King Company, amounting to about 320 acres, which would seem to be in a position to hold the ore deposits of the Copper Queen in their trend eastward. The Copper King is but a prospect at present, though one that apparently justifies the hopes entertained by its promoters. A shaft is being sunk—now 90 feet deep—with good indications. The plans are to sink this and two other shafts to a depth of 500 feet. Surface indications and the location of the Copper King claims in their relation to the well developed mineral zone of the Copper Queen, favor the probability of success. The promoter of the new prospective mine is a stock company, whose directors are Messrs. B. C. Davis, W. H. Mack, Thos. F. Gaynor, Chas. R. Lee and Jere R. Fleet, with offices in Brooklyn, N. Y. WASCOTT.

Bisbee, Arizona, April 22nd, '97.

The Gold Belt of the Lower Colorado River.

"A dark-hued lizard on the dark-hued sand;
A rock, a short gray tree: above, an equal sky—
She sits and dreams. The whiteless blue of heaven
Comes down to meet the greenless brown of earth
And compasses her dream."

And this is Arizona and the desert bordering the Lower Colorado river of the West. And the languor of the dreamer is passing, giving way to the promise of a glorious future replete with success from energetic efforts. It is said "nature equalizes matter;" hence, because of the unkind physical surroundings peculiar to this region, it would appear compensation has been and will be had in the marvelous depositions of the precious minerals beneath the forbidding exterior. Values in gold, particularly, commensurate with the hardships and actual physical suffering endured in quest of the yellow metal in this dreary zone of desolation, have been and will be found. Of the many meritorious gold strikes now in the embryotic state of "prospects" and being worked from Ehrenbergh northerly to the vicinity of Yuma, on and along the Colorado and Gila rivers to southerly, we will not at this time touch. It is of those known to exist, actualities, tangible values in gold as found in better known prospects and mines, this letter will treat.

Beginning with the latest recorded and verified strike in the S. H. mountains, eighty miles northerly from the town of Yuma and thirty miles from the Gila river: Though having no personal knowledge of the strike at the King of Arizona, or locally called the Gleason group, yet from reliable authority and from samples of ore in hand we find a very peculiar and interesting new condition. The lode vein crops for three claims in length—4500 feet—and holds an average width of about 20 feet, in a diorite and porphyry contact. The great mass of the vein matter is a hard, reddish black, hungry-looking limestone, and a bluish and cream-colored sugar quartz 4 feet thick on the hanging wall threaded and shot with coarse gold of a value up to $1 per pound of rock. Again, the highest values in this free metallic gold are held in a yellow carbonate of lead and a matrix of "sugar quartz." Other samples are of a fine quartz conglomerate, through all of which iron as an oxide-carbonate and hematite appears. Along the cleavage of the rock strata of vein stuff occur seams of calcspar.

All of this matter is impregnated with coarse, visible gold, though in much of the dense limestone where no gold is visible even under the glass, string and shot gold is had from the hornspoon. I am creditably informed that the 4-foot pay streak will not run below $50 per ton and up to $2000 gold per ton, and the remaining 14 to 16 feet of width of vein spoons approximately to plate $8 to $12 per ton. Until the outcrop is broken it appears to be but ordinary "mal paies" (hard, black, porous lavas). Part of the vein is in high, serrated cliffs. Until a fresh fracture is made this appears to be valueless, volcanic rock. When broken it was first pronounced a black quartz; investigation shows it to be limestone. This emphasizes the writer's reiterated advice to desert prospectors to pass no defined ledge of rock without breaking samples for a fresh fracture, for the sunburned, sand-polished outcrop of all rocks looks alike in blackened, shining surface in the desert. It is enough to say the King of Arizona group is a tangible reality so far as extensive and high surface values in gold goes, and from a practical miner's standpoint this 4500 feet in length of regularly defined outcrop in a contact of primary rocks the future of the vein at depth is assured, presumedly with it precious burden.

Next in order of discovery is the La Fortuna, on the Gila river, near Yuma. This, from all accounts, is a huge "pipe vein" some 400 feet in length along the strike, all pay and 2 to 12 feet thick, that has attained a depth of 300 feet; and its record can be boiled down to the regular result in shipments of gold bullion from twenty head of stamps, running from $80,000 to $100,000 monthly. This holds in value and strength with depth.

Were these two late finds in Colorado they would long ere this rival the world-wide reputation of Cripple Creek. As it is, the La Fortuna is quietly pounding out fortunes every month and is simply a close corporate and quiet business affair; while in the really remarkable volume and values of gold in the King of Arizona, or Gleason group, local people of small means, having secured an interest, are putting in ten stamps thirty miles distant, at the nearest running water on the Gila river, and will make the mine purchase any additional plants required.

Let us see how Arizona and the desert compare with other and more favorably situated regions. In addition to the properties mentioned, we have the Harqua Hala with about $3,000,000 to its credit, now paying leasers handsomely, after the usual top-heavy English company shut down. Again, the Congress mine with no clatter, no blast of trumpet, sending out bullion regularly and at a depth of 2000 feet having ore blocked out for many years' work, to go through their 40-stamp mill. They have modern plants and methods in all particulars, and it is probably the equal as a dividend mine of any on the Pacific coast, and that means the world. The next in order is the old Vulture mine with $15,000,000 production from the surface zone, and to the 600 level. This has at last got into the hands of men with money and nerve to drive down to the lower ore zone, when this old producer will doubtless continue a dividend property for years to come.

I wonder if it ever occurs to some of our California mining men, when they condemn by wholesale the desert mines as mere surface or infiltration deposits, that very much the same talk held back developments and driving for the lower ore zone on the mother lode of California for many years, until men having the money and doing a little single-handed thinking on their own account solved the problem of permanent ore bodies of great magnitude below the barren vein matter of the surface ore zones and made the mother lode of California a synonym for great and lasting mines. Diamond Joe Reynolds did this on the Congress mine, which, by the way, was originally worked for the copper, and depth made of it a gold mine.

Pray, gentlemen, why should this happy condition be confined to northern California? However, this is a matter that will be defined in the early future, as this desert region bordering the Lower Colorado river is being thoroughly exploited by Colorado mining men who are corraling every tangible mining prospect of merit they can secure; and the energy, ability and nerve that have made Colorado what it is to-day will surely demonstrate more permanent paying mines in this region.

The Gold Rock of San Diego county, California, near Yuma, was condemned in its prospect state by at least two distinguished and able California mining experts, yet it appears to be doing pretty well with 60 feet thickness of $6 to $8 rock at the 300 level, and 120 stamps dropping. This, the Gold Rock—a segregation vein in porphyry—is certainly a property of merit and under competent management would never have got into the hands of a receiver. It was the old thing of "biting off more than you can chew." While forty stamps were making money, eighty stamps additional required some pretty low-grade stuff to go under the hammers to keep them all dropping. Then they started to economize at the wrong end by cutting down the pay of their millman—one of the best on the coast. He quitting, all sorts of tank men, crusher feeders and general mill swampers tried it a rattle and the tailings pond fattened, until the old millman was recalled at double his past salary. The Gold Rock is a good property.

The Senator mine (the old Buena Vista), fourteen miles north from Yuma, has a 12 to 40-foot vein at the 200 level, and 2 to 6 feet good pay. A mill will soon go up of twenty stamps, and the mine is regularly and systematically blocked out for stoping, with large reserves in sight. They are a mile from the Colorado river, in San Diego county.

To the contrary, Picacho district of San Diego county is erecting mills galore near the river's bank, with perfect confidence that mines must of necessity be found. Really, there have been more misleading reports from this district than any other in this lower desert country. They are not of the order of poor men's mines; they require capital to condition for successful work and the strictest economy of management. Excepting the Jaynes group, there is nothing demonstrated to be called a mine. There are many meritorious prospects in Picacho, of low-grade ores, but the wild, fantastic tales of 50 to 200 feet of $20 to $50 per ton rock are romances pure and simple. It is not the occasional hand samples of rich rock that make the value of a mine. It is what, day after day, in continual average of an ore body that the commercial value is found.

The "crosscutting of 50 to 200 feet of vein, and no walls," as reported, is eminently correct, as there are no walls defined and gouge-cased in the district, so they could not well be in sight. There are zones, by courtesy called veins of segregation, with no regularity of system through the district. In these zones occur thin seams of quartz, pinching and swelling from a "shoe string" to a few inches thick; also detached pockets of rich rock. It is what is known to the miner as "spotted," like plums in a pudding. Now, to get these rich seams and pockets close enough together to be able to work the entire mass, is the problem. This, in many instances, is assured, so far as surface prospecting shows. Again, capping of a brecciated conglomerate in a calcareous cement, generally, and gold-bearing in pockets, occurs in apparent flows having defined trends through the ryolitic rocks. The entire basin is made up of a jumble of porphyries, granites, slates, etc., with an occasional intrusion of igneous rock, protruding as peaks through the unsystemized mass. Much gold has been taken out in places, derived in the opinion of the writer from these rich seams and pockets of quartz. In some instances concentrators will be required to recover the gold values iron coated and scattered through the vein stuff.

The mines of this district are exceptionally easy of access, and the ore may be mined cheaply. The probable value of the ore will run from $2 to $10 per ton in gold. It is specially free. By modern methods, under competent economical management, with the favorable location—twenty-eight miles from rail facilities at Yuma and a navigable river for five miles and to the river bank—this district may be made a dividend producer.

Stories of large deposits of $50 rock and up result in harm. The posted mining man don't believe them. The novice, if of an economical (?) turn, does his own experting, builds castles in the air on the half-dozen colors of light gold in a pan test, really representing from $3 to $5 per ton and which he is assured is $20 rock. Getting to the end of his financial rope he is choked off with a curse on the gamble of mining, when really he has not used simple business discretion in his preliminary investigation.

There are up, and on the way, one 10-stamp mill and six other mills, by one company, and not one foot of ground regularly blocked out for stoping. It is true, probably, as claimed that considerable development in a small way has been done by nature in the cutting of gulches through and across these ore zones. Yet a mining man would like more tangible values actually susceptible of measurement in sight than are found in a few shallow shafts and surface trenching.

This in a nutshell is the condition of Picacho district to-day. There are extensive bodies of low-grade gold ores with a friable gangue, and a straight-away free-milling amalgamating rock that may be mined, handled and reduced at a specially low cost, after the first expense of the installation of the required hauling and reduction plants.

Do not infer that these are all of the mining camps of the Lower Colorado river. There are many properties being worked and some now under bond to Colorado people that will be heard from in the early future. Reference is here made only to the better advertised camps. There is no boom on, but the burning of powder and breaking of ground is going on from above Ehrenbergh to the Sonora line, bordering the Lower Colorado, to an extent not known of before even in old Yuma, by a working, not a jawbone fraternity, having faith in their holdings.

Systematic prospecting of this desert region now nor at any time has been made. The country formations are the most promising and fruitful, and the Colorado river from the Grand Canyon to its mouth is highly mineralized on both sides for many miles back, and its vast possibilities have hardly been touched. More earnest prospecting has been done the past two seasons and the result is partly outlined above. The man with money has his agents in the field, and the dawn of a grand future for desert mining is here. A plain statement of facts that may be proven is of more ultimate value than the hysterical statements of stray news reporters, who enthusing on a hand sample of gold rock run to adjectives and gush when writing of this region. TAYLOR D. MACLEOD.

Yuma, Arizona, April 25th, '97.

What Slip of the Wheel Means.

On steamships one often hears the expression "slip of the wheel." Now the meaning of this may be explained in a very simple manner. It is the difference between the actual distance run and the distance that would have been covered had the propeller acted upon a solid substance instead of a fluid. In other words, the expression may be understood as the lost motion of the propeller. It is usual to allow a certain number of revolutions to the propeller or paddles to the mile, and at the end of a stated time the estimated distance run by the ship, according to the number of turns made, is compared with the actual distance run by the ship according to observation of the heavenly bodies or by the patent log, and the difference between these two records is expressed as a percentum, and entered in the log book as "slip of wheel." Retardation by reason of head winds and high seas comes under the head of slip. For example: If the distance run according to revolutions is 100 miles, and the actual distance run is 75 miles, the slip of wheel is 25 per cent.

Mining Summary.

CALIFORNIA.

Amador.

Republican: At the Valparaiso they are working the rich ore extracted during the last three weeks. This ore is of the black metal, arsenical sulphurets variety. It is not free milling rock.

At the Union Consolidated ten stamps of the mill were started a week ago on ore taken in excavating for a station at the 500-foot level. The rock is an improvement upon the ore met with in the levels above. Twenty men are now employed about the mine and mill, and the number will soon be increased, as it is the intention to run the mill to its fullest capacity as soon as the 500 level is opened up.

It is reported that the Muldoon mine has been bonded to San Francisco parties for $5,000, and that $2000 has been expended thereon. Work is expected to commence at an early date.

Dispatch: The Argonaut Company has levied an assessment of 5 cents per share. They are at work upon the foundation of a 40-stamp mill and are pushing the work as rapidly as possible.

At the Wieland they have struck the gouge ledge at the 500-foot level, and have a better looking ledge than was encountered at the 300 or 400-foot levels.

Ledger: At the Black Prince the new machinery has been placed and two shifts have been kept at work. Ore has already been shipped for treatment.

Drifting continues on the Anita, running north to tap the ore chute on the Shober ground, and they have run the west drift about 200 feet.

At the Good Hope drifting has been stopped and the work of sinking has been resumed.

At the Kennedy a contract has been let for the new hoisting works to be placed over the north shaft.

The DeWitt mine, adjoining the Amador Queen mine on the west, is running a shift day and night to tap the ledge.

On the Amador Queen the erection of the new hoist has been completed. The shaft is down 520 feet.

Five concentrators were put in the Quartz Glen mine at Rich gulch last week.

The company who have been working the Del Ray under a bond have been actively engaged in exploiting with quite a large gang of men. At the 150-foot level they had good ore. The company have taken up the bond and are now proprietors of the mine. They propose to continue active operations on a more extended scale.

Butte.

Register: At the Magalia or old Pershbacker mine there are sixty-five men employed. They are running north on a new lead, running southeast on one channel, and also cleaning up the old works. The north channel leads toward the Princess channel.

There are fifteen men employed on the Princess mine and the pay gravel is good.

The Pomerat quartz mine, which has been bonded to S. H. Jackson of Chico, gives employment to fifteen men and the rock taken out is rich in free gold.

The Orleans quartz mine, near Coutolenc, has been bonded to San Francisco parties, who will begin work at once.

On the Matherson quartz mine five men are employed.

Ten men are employed in the Bader mine.

In the Ethyl or old Wylie mine three shifts are employed and twelve men are at work.

Ten men are employed in the Dix mine, on Butte creek, and six men are at work in the Best mine, on the same creek.

At Nimshew the Butte Creek quartz mine is about to be opened and a number of men will be employed.

The Nimshew Gold Mining Company, Geo. C. Higgins superintendent, is sinking a shaft to tap the old Blackleg tunnel and are also opening the Emma mine.

It is reported that the Kane mine, near Inskip, has been bonded to Goodall, Perkins & Co.

Peter Woods is working his mine on Scott's bar, on Butte creek, and is taking out good pay gravel.

Calaveras.

Chronicle: P. L. Sherman is developing the Paragon group of mines, near West Point. They are the Paragon, Mountain View, Bullion, Tip Top and La Palomacita. They are so located that all may be worked from one cross formation tunnel. This proposed tunnel, when in a distance of 1200 feet, will cut all the above leads giving vertical backs of from 200 to 500 feet. At present the work consists of the extension of three tunnels, which will tap the La Palomacita, Mountain View and Bullion lodes at depths ranging from 150 to 250 feet vertical, and when these veins are cut drifting will be prosecuted north on each vein, where greater backs will be had. A 10-stamp mill is now being constructed.

Amador *Dispatch*: The Gwin mine has struck some very rich ore in the 1400-foot level. One piece was taken out last week that had over $500 worth of gold in it. The streak of this rich ore is not wide and varies as it goes, but seems to run along the whole length of the vein.

Citizen: The Scieffard mine, near the Kentucky House, was bonded last week to the Western Mining Company of San Francisco, of which Claus Spreckels is one of the shareholders. The ledge was discovered about a year ago, when a shaft was sunk on the vein to a depth of 55 feet and a tunnel run for 180 feet to tap the ledge.

The Gillen placer mining claim, situated at Spring gulch, east of San Andreas, is being prospected by a mining company from San Jose with a view of taking a bond on the property.

El Dorado.

(Special Correspondence). — J. W. Armstrong has just started two shifts on the old Plymouth property, one mile northwest of Kelsey. In the sixties this mine had a 4-stamp mill in operation, and produced considerable money from surface cuts. The present company will sink deep and give the property a fair test.

M. A. Murphy has bonded the Old Judge mine, near Kelsey, to F. W. Beardslee, J. C. Shepardson and a party from Los Angeles, who speak of immediately opening the property.

Gilson, Sutherland & Company are about to erect a 10-stamp mill on their extensive gravel plant at Grizzly Flats.

The Grand Victory Company are about to increase their motive power, and are adding new pumps in connection with new boiler and compressor works.

Goulee and Hilbert have reached 40 feet on a 3-foot ledge of ore that yields a good mortar test. The shaft is on the vein. The property is in Kelsey canyon, near the village of the same name.

George Thorsen, a successful prospector, is running a surface cut and tunnel on a 20-foot ledge, on a property adjoining the Kelsey Gold and Silver mine. The ore and gouge matter all yield a fair prospect of free gold.

Thirty tons of ore, crushed at the new custom mill, from surface cuts on the Lloyd property, yielded 300 pounds of rich sulphurets and $21 per ton in free gold.

Placerville, May 3, '97.

Republican: It is reported that the Pocahontas mine at Logtown will start up soon. This is one of the oldest quartz mines in the county, and has been very rich. It has been idle for years, except two or three months last summer.

The Channel Bend mine, where a company has been exploring a body of gravel on a bench of the American river, northest of Georgetown, shut down this week.

But little work is being done at the Grand Victory at present, as the mine is flooded with water. About the first of the month the miners drilled into a seam from which water was forced out like a hydraulic through the drill hole. Since that time the pumps have been unable to control it, and water has risen from the 300-foot level to within 70 feet of the top. The two pumps, throwing 12 or 13 inches of water, at first lowered the water, but when nearing the lower levels could make no impression on it.

Kern.

Californian: At Havilah, McNulty and partners have bonded the Hart mine to a San Francisco company.

John Hays, one of Kern's most successful mining men, has some leasers working in the Ophir and Canty mines. Both are making a good showing.

Shipsey and Moore have made a good clean-up from the Marguerite. The seams are about 12 or 14 inches.

Mr. Coulson, representing New York and Pennsylvania capitalists, has purchased the Rotschford and New World mines. The latter was owned by G. Miller of Havilah. There is considerable development work to be done. A tunnel of 800 feet must be run on the Rotschford and one 400 or 500 feet on the New World. If Mr. Coulson's expectations are realized he will have a 20-stamp mill running next spring.

On Piute mountain the Bright Star mine has been sold to an Eastern capitalist.

A number of small claims have been sold in Kelsoe canyon.

Mariposa.

Gazette: Near Hornitos within the past couple of weeks operations have been commenced on three different mining properties. Several men were put to work at the Campodonico mine. The Mt. Gaines mine, which is reported to have recently changed hands, has a force of men at work on it. The Barcroft mine, another of the mines which is reported to have been sold recently, is being operated.

The California Exploration Co. has purchased the Virginia mine, that has been in litigation for over eighteen years, and is proceeding actively to develop it.

Nevada.

H. H. Beck has sold the Reno, Nev., Reduction Works to W. H. H. Graves of Oakland and B. A. Cardwell of Salt Lake City, who propose to enlarge and remodel the plant. It is expected to employ fifty men. B. A. Cardwell is interested in the Meadow Lake mines, and says that the ore can be worked at a cost of $5 or $6 a ton. His process is to crush the rock with rollers and concentrate, from which he says he can save 96 per cent of the assay value of the ore by melting it. He wants to build a wagon road to Truckee.

Transcript: Arrangements are being made for working the Pittsburg mine on an extensive scale. It has been pumped out to the 600 level, and in a short time the water will be down to the 800 level, when the work of sinking the shaft deeper will begin. An air compressor plant for running drills will be put in. There is a ledge on the 600 level from which quartz yielding well has been taken.

Union: In a few weeks the Nevada County Electric Power Company will undertake their scheme of working the South Yuba river bed. The water of the river will be diverted into the company's flumes, which will permit of working nearly the whole of the four miles of the river located by the company down to bedrock. For several years past considerable portion of the river has been worked by Chinamen under lease. Superintendent DeSabla frequently imposed more severe conditions upon them, but they found it profitable even after paring a very liberal royalty to the company. They never worked the river, however, to bedrock, where it is expected to be found the richest.

Tidings: At the Pittsburg mine the water has been lowered, so that the 700-foot level will be uncovered within a day or two. When the 800-foot level is reached, sinking will be resumed. Besides that, a large force of men will be put on to open out the various levels of the mine.

Placer.

Sentinel: At the Chicago drift mine, owned by G. L. Threlkel, a body of gravel has been encountered.

At the Haskell mine, near Auburn, gravel was reached in the face of the bedrock tunnel last week.

The Laird gravel mine, near Loomis, employs twenty men. The gravel mined is bringing good returns. The Laird, the Chicago and the Haskell mines are all supposed to be on the same channel.

Waugh, Walker and Duryea are developing the Lady Hanson quartz ledge, two miles northeast of Auburn.

A corporation has been formed of Placer county people to reopen the old Dardanelles mine, which has in its long history produced over $2,500,000 as a drift and hydraulic mine.

At the Gold Blossom mine, at Ophir, owned by Charles F. Reed, and which has been paying very well for some time, arrangements are being made to sink a double-compartment shaft to a depth of 1000 feet.

Plumas.

Independent: The Little Jamison Company contemplate adding twenty stamps more to their mill, making a total of thirty stamps.

The Plumas Eureka mine will start in crushing ore as soon as the snow is gone.

At Johnsville the Claybank tunnel will be run ahead towards the north side of Bald mountain, where it is generally believed the Thistle Shaft channel lies buried.

There has been let a contract to run 400 feet of tunnel into the Glazier mine on the Nort Fork.

James H. Challen, superintendent of the Topaz Centennial mine, also the Golden Ancient Channel and the Yellow Jacket mines, has two shifts driving forward the tunnel in the Topaz, which, when advanced 600 feet, will it is expected strike the rich gravel channel in that property. Work on the Golden Ancient Channel and the Yellow Jacket properties will be commenced as soon as the snow is off, when it will be practicable to get on the ground with mining supplies, etc.

San Diego.

Ramona *Sentinel*: At Julian a strike is reported in the Richmond mine.

The Ranchita mine is turning out high-grade ore.

Mr. Jacoby has let a contract to run a 250-foot tunnel on the Tom Scott mine.

Shasta.

Free Press: At the Niagara mine extensive preparations are being made to resume operations. The O'Neil tunnel, which is now in 2700 feet, is being extended, and by the first day of May a large force of miners will be put to work getting out ore. The ledge is 4 feet in width. On June 1st the mill of eighteen stamps will be started. The workings on the O'Neil level are now in 700 feet from the surface. By running a tunnel about a mile in length the ore chute in the O'Neil tunnel could be tapped at a depth of 1500 feet; but as this would be very expensive, a hoisting and pumping plant will probably be put in. The Niagara Company has recently been reorganized. The syndicate of Dutch capitalists which formerly controlled the property has sold out to a number of people in San Francisco.

Sierra.

Messenger: Isaac Copeland is about to commence operations at the Independence quartz mine on Wolf creek.

The California Debris Commission has received an application from M. J. Williams and others to mine by the hydraulic process in the Galena Hill mine, the tailings to be deposited in Eastman's ravine.

The mill at the Northern Bell mine started again last week, and several men were put to work.

Siskiyou.

Journal: The Hunter & Simmons claim at Hawkinsville is still worked with good success, the big pump at Shasta river keeping their ditch at the top of the hill supplied for operating the giants.

The Gold Ball mine, near Sawyer's Bar, is still idle and probably will be for some time to come, until the difficulties which it has been under for a number of months past are finally settled.

The Salmon River Ditch and Mining Company are at work at their big hydraulic mine near Sawyer's Bar. They have handled a large amount of gravel already this season, and it is reported are doing well. This mine is fitted up with modern machinery and has an electric plant.

Work has been commenced again on the Greenhorn blue gravel mine, and the shaft will soon be free from water to permit sinking down to bedrock.

The Black Bear mine, owned by John Daggett, is now in operation, with about ten men employed.

Wm. Bennett has four mines in operation now, and is doing very well with all of them.

News: The fine weather has started a number of prospectors out in the mountains to look for ledges, some of whom have already made promising locations. The best reports come from Cherry Creek and Oak Bar districts, although there is considerable activity in other districts.

James Morrison arrived in Quartz valley last week and is making preparations to start up work in the quartz mine owned by Abram Erno and himself.

Dave McCook of Humbug district has uncovered an 18-inch ledge in his Mount Shasta mine.

Trinity.

Redding *Free Press*: The Brown Bear mining property at Deadwood is being cleaned up and prepared for the inspection of parties contemplating its purchase. The mine is now in such a shape that to further develop it a very long tunnel must be run or a hoisting plant erected, requiring the expenditure of a considerable sum of money. Of late years lessees have worked about in the upper workings, taking out small bodies of ore, which was milled at the company's mill.

At the Altoona mining operations will soon be resumed. Since the day the mine was flooded the Cornish pump has been constantly throwing a 10-inch stream of water. The water is being gradually removed from the mine; but if Mr. Williams finds the work progressing too slowly he will immediately order a huge Dow pump shipped from San Francisco. Everything will be placed in readiness to resume operations on a large scale as soon as the mine is dry.

Journal: A company proposes to sink one or more shafts in Weaverville basin to test the question whether or not there is a deep channel of pay gravel there. A subscription paper for stock has been drawn up and will be circulated. It is estimated that the cost of the necessary machinery and labor to sink the first shaft would be about $3000. The machinery once purchased, the cost of sinking succeeding shafts would be much lessened.

At the Nash deep gravel mine, on Coffee creek, owned by an English company and superintended by Mr. Maitland, the long bedrock tunnel has been finished and a long flume will be built.

At Carrville work on the Strode mine has begun for the summer; ten or fifteen men are employed and the mill is now running.

On the old Bloss & McClary placer mines Jas. Eligh and partners have been working steadily all winter and have taken off a large amount of gravel, and still have a long sluicing season ahead.

Tuolumne.

Democrat: At the Black Oak sinking in the main shaft, which is nearing the 800 mark, goes on day and night, and when that depth is attained new levels will be run. The major part of the ore comes from the 700, where a 10-foot ledge of well-defined ore is being stoped out. Ten stamps are being added to the mill. The cyanide plant, with a capacity of thirty tons per day, will soon be in operation. A contract has just been let for a six-drill air compressor to supplant the old inferior one. Forty men are employed about the mine.

At the Rappahannock the shaft has attained a depth of 650 feet. It will be driven down to the 1000-foot mark without a stop. On the 600 level a station is being put in and a level run to the ledge.

The Punch Bowl gravel mine, on Table mountain, is having a quarter-pitch incline shaft run down on the rim to tap the main channel.

Independent: The Golden Rule is reported to have struck a vein of rich ore.

The Dutch mine crosscut, on the 300 level, shows up a vein with 18 feet of pay ore.

The Rosedale gravel mine, near Jamestown, has been sold to G. Leeney and M Price.

The Queen mine, at Stent, is being worked by a San Francisco company, which has bonded the property.

The Alameda mine is sinking in its main shaft and has encountered some rich ore during the past week.

The Grey Eagle mine at American Camp, which was bonded some time ago to M. Page & Co. of San Francisco, was started up last week with Mr. Page as superintendent. Five men are at work.

The Green mine, near Confidence, has been bonded by A. P. Minear.

The Providence mine, on the north fork of the Tuolumne river, has struck an 8-foot vein which shows up well in free gold.

The mill at the Norwegian mine is nearing completion and will shortly be put to work crushing the ore now being taken out.

The Columbus mine, in the Cherokee district, is drifting on the 200 level under the superintendency of J. E. Summers. Good ore has been encountered.

The Confidence mine is getting its plant into working condition. New mortars and a rock crusher are on the road, and will as soon as possible be placed in position. A contract has been let to sink a 100-foot air shaft at $3.50 a foot.

The Tarantula mine has its new snaft down 40 feet. The ledge is increasing in size and value.

The Omega mine, owned by Ayres & Bradford, and adjoining the Rawhide No. 2, has been sold to the Jumper syndicate for $40,000, $10,000 of which has already been paid.

NEVADA.

Reno *Gazette*: In Humboldt county the Barber Canyon placer mines, near Dun Glen, are still being worked with success. The working force was increased to forty men last week.

Jonas Nelson is working one of the old silver mines in Antelope district on shares. He made a shipment of ore to the Selby Smelting and Lead Company last week, which runs about 110 ounces of silver and 40 per cent lead.

The Thornton Brothers, who discovered a rich lead in an old abandoned mine at Unionville last winter, assaying from $300 to $900 in gold, have recently erected a 2-stamp mill near the mine, and commenced crushing ore.

The Blackbird Mining Company have ceased operations on their tunnel, which was run a distance of about 450 feet to tap the ledge at a depth of 80 feet below the lowest workings, but thus far have been unable to strike the ledge, which, no doubt, is due to a "fault" or "dip" in the vein. Mr. Strong, the superintendent, has gone to Detroit to consult with his company as to the advisability of continuing further explorations.

Placer diggings were recently discovered near Rabbit Hole, thirty miles north of Lovelock. The owners of the many claims have subscribed for making a ditch to carry water to the grounds, six miles.

The Quong Foo Placer Mining Company of San Francisco began active operations at Rock Hill, near Mill City, May 1st, under the supervision of J. C. Jones of Ione, Cal.

At the Adelaide copper mine, south of Gol-

conda, owned by an English company, the vein has been cut at four different points and discloses a body of ore of a uniform width of 40 feet. Thirty-five men are sinking a double compartment shaft 300 feet in depth and when completed active operations will commence with 150 men.

The Foltz placer mining property, south of Mill City, was bonded to Messrs. Humphreys and Griffin last week for $20,000. They are endeavoring to place it with a Denver company, who will operate it on a large scale in the event of their purchasing the property.

White Pine *News*: Several men were put to work grading roads and millsite at the Chainman mine last week, preparatory to bringing in the necessary machinery.

Work was started up on the Millionaire mine the first of the week.

The machinery for the mill of the Ben Hur Mining Co. has arrived and will be erected immediately.

The Steptoe mine in the Shell Creek range of mountains, east of Ely, the property of the Brim Bros., Salt Lake City, is among the rich lead propositions in this vicinity. The ore vein is well defined, about 2 feet thick and carries 73 per cent lead with occasional stringers of almost pure metal.

Gold Creek *News*: On April 28th the water stood at 14 feet at the tower in Little Sunflower reservoir. This represents more than 100,000,000 gallons impounded, or about one-eighth the capacity of the reservoir. The water now covers about seventy-five acres and extends back over a half mile to within 100 feet of the dike on the west. This water all comes from the lower part of the watershed. As yet there is no water flowing through the intake ditch from the three upper creeks. The work of puddling and strengthening the banks still goes on.

OREGON.

Grant's Pass *Observer*: The Black Gold Channel Mining Co. of Foots creek has expended several thousand dollars during the past few months in new ditches, pipe and flume. Piping is being carried on with a 350-foot pressure. The new flume is 5x3 feet in size and 1300 feet long, and there is 3000 feet of tunnel on the bedrock in the old channel.

The Gold Dust mine on Grave creek is being cleaned up. The proprietors, Hale Bros., Willke & Porter, intend digging another ditch 5 miles long and 4 feet on the bottom, which will give them water for nine months.

Rogue River *Courier*: The Pickett Creek placer mine, owned by John, Judson, Owensby and Keith, is piping night and day. The old channel overlooked by miners for forty years is now being tapped, and prospects rich in fine gold.

A 5-stamp mill arrived last week from San Francisco for the Jewett mine. When running, this mine will employ from 15 to 20 men.

Grant's Pass *Mining Journal*: Two big mining ditches are being constructed from the east fork of Pleasant creek to the new hydraulic mines near the mouth of Jamieson gulch.

Work will soon be commenced on the mining ditch from the Saxe Creek falls to N. D. Young's placer mine, where a hydraulic is to be put in.

On Grave creek and its tributaries there are twenty hydraulic plants, most of which have made profitable seasons.

WASHINGTON.

Spokesman-Review: James Crawford will resume work on the Morning and Evening properties for the Pierre's Lake and Flat Creek Mining Company next week. This contract calls for three shafts, each 50 feet deep, at various points along the vein.

The Clyde-Mohawk Mining Company of Spokane will also put a force of men to work on their properties on Touloo mountain. This is the second property placed under active development work in this camp during the present month.

At Chewelah the Spokane Copper Mining and Milling Company will do considerable work on the Grand and Magnus the coming summer.

J. H. Watts of Salt Lake City, on behalf of an Eastern syndicate, has taken a bond on the Hopeful, Montana and Concord mineral claims, in the Methow district, the consideration being $75,000, one-tenth of the consideration being paid.

BRITISH COLUMBIA.

(Special Correspondence).—In the last six months over 2000 miner's licenses have been taken out in Westminster district alone. As there are some nine recorder's offices, at the same rate there would be 18,000 or 20,000 persons who have taken out privileges to prospect in that period. Double or treble that number in the Province had before that period secured their licenses. Last week in New Westminster there were 148 miner's licenses issued and seventy-seven claims recorded.

In Lillooet the new ledge of the Alpha Bell proves to be 20 feet wide. The Alpha Bell is situated on Cayoos creek a few feet from the Golden Cache. A gang of men are stripping the ledge.

On the Athabasca, a free milling mine in Nelson district, 260 feet of tunneling has been done and nearly 100 assays made of the rock. The last three assays at a depth of 200 feet as shown by the certificates, run as follows in free gold: $127.80, $164.07 and $192.75. In sixty days a stamp mill is to be erected.

The shaft on the Silver Tip mine, Taxada island, midway between Vancouver and Victoria in the Gulf, is down 90 feet, showing 4 feet of high grade ore containing from 9 to 15 per cent nickle and $25 in gold.

The snow is rapidly melting off the mountains in Harrison Lake country near Westminster City and the Indians have consented to take in white prospectors. A gang of men have started for the Fire Mountain prospect which is said to be the biggest strike made here for years. Two fissure veins run parallel in this mine and are cross-cut at intervals by other veins where the rock is rich. The tunnel has been driven in 100 feet.

Vancouver, May 1st, '97.

Spokane *Chronicle*: In the Cariboo gravel mines of the Horse Fly Company, under the management of John B. Hobson, the machinery for the 10-stamp mill for crushing the cemented gravel is on the ground and a crew of carpenters are at work. The mill will be completed and started in about six weeks and the mine will be opened up. The main tunnel will by that time be pushed in sufficiently to keep a supply of gravel for milling.

Rosslander: Superintendent C. P. Robbins reports that eighty tons were shipped the past week from the Iron Mask. In a couple of weeks the connection will have been made with the old workings and the output of the mine will be more than doubled.

A strike was made in the War Eagle last week which the management consider to be of considerable importance. On the 125-foot level, where the east and west drifts intersect the vein there is ore on the face of both drifts, which are 120 feet apart.

The Sovereign mine, owned by Peterson and Ryan, has been bonded for $36,000 to A. W. Morris of Montreal. The Sovereign is located on Lookout Mountain, near Trail. The ledge has been tapped by a tunnel of 120 feet and the mine is fairly well opened.

Spokesman-Review: In the Ainsworth district the Mile Point is putting in expensive machinery and working a crew every day. The mine is under bond to an English syndicate for $40,000.

Twenty men are at work on the Tariff sinking a shaft.

The Black Diamond and Little Phil are working thirty men and are shipping ore regularly. New drill and compressor plants have been ordered for these mines and will be erected as soon as the railroads can land them.

The No. 1 is working twenty men in the mine and concentrator on pay ore.

The Jeff Davis is sinking a double compartment shaft, which is now down 35 feet. A drill and compressor plant has been ordered by this company.

The Highland mine has been working a crew for some time and arrangements are making to put in a concentrator.

Ten or fifteen men were put to work on the Twin this week. The Twin was practically sold last week for $35,000.

T. M. Gibson, representing the owners of the Black Diamond, Little Donald and other claims, recently purchased the Lady of the Lake, Hamburg and Sovereign for a consideration of $8000 cash. The Mamie was also purchased by the same parties for $3500 cash.

A 100-foot contract has been let on the Star claim and as the shaft goes down, the showing, which is a good one, continues to improve.

At New Denver several deals have been made of late, among them the Bachelor and Get There Eli groups, on Twelve Mile, to G. A. Farini, London, England, for $12,000 and $12,500 respectively; the Palmita, on Carpenter creek, to E. C. Clarkson of Toronto, for $20,000; the Heather and Heather Fraction, to Vancouver parties, for $10,000, and the Hyderbad, on Ten Mile, to a Vancouver company, for $18,000.

UTAH.

Mammoth *Record*: It has been decided to abandon the North Swansea Tunnel Company project, which had in view the running of a tunnel through the mountain north of Robinson.

The Sioux mill, which is being operated under a lease by Payton & Bacorn, is now running at its full capacity on Ajax ore. It is probable that 1500 to 2000 tons of this ore will be run through before a start will be made on the Sioux product.

The Opex shaft has now reached the 500-foot level and drifting has been commenced.

Shipments from the camp for the week have been as follows: Carisa, four cars; Mammoth concentrates, four cars; Ajax, five cars.

Bingham *Bulletin*: The new owners of the Winnamuck will carry out the plans of the old company in regard to deep working.

Col. O. B. Hardy last week transferred to Chicago parties his entire interest in the Bingham Copper Company's property, and resigned his offices as president and manager.

Silver City *Star*: The ore body recently struck on the 265-foot level of the Morning Glory is said to be improving in character.

A strike of high grade ore was made in the Boss Tweed this week, assays showing 42 per cent bismuth.

The Olson Bros., who have a bond on the Governor for $20,000 have begun work on the property.

The Buckeye records two strikes this week; one on the 270 level and the other in the shaft at a depth of 350 feet. The ore from the bottom of the shaft shows 8.5 ounces silver and $22 gold, while the body of pyrites which was also encountered in the shaft, shows 13 ounces silver. The ore from the 270 level runs over 100 ounces silver and 10 per cent copper.

The week's shipments were as follows: From the Bullion-Back mine, fifteen carloads ore; Bullion-Beck mill, ten carloads concentrates; Centennial-Eureka, five carloads ore; Eureka Hill, five carloads ore; Uncle Sam, two carloads ore; Carisa, four carloads ore; Ajax, five carloads ore; Mammoth mill, four carloads concentrates; Sioux mill, two carloads Ajax concentrates; South Swansea, five carloads ore; Dragon Iron mine, three carloads ore daily.

MONTANA.

Butte Miner: The Diamond R. Mining Company is to build a concentrator at Neihart, for the reduction of its own and custom ores. Ira Myers, president of the company, reports that the company will build a non-freezing flume from main Belt creek. The concentrator is to have a capacity of 100 tons daily.

Clark, Renshaw and Dunbar are working on Dr. Mitchell and Mr. Hennessy's Pierre claim in Granite county under a long lease. They have undertaken to drive a 400-foot tunnel under the old workings of the mine, which in former years yielded high grade ore that was shipped out.

The Butte and Boston is gradually increasing its force at the Blue Jay, Gray Rock and Silver Bow mines. At the East Gray Rock pump stations are being cut on the 700 and 1400-feet levels, and development work is also in progress on the north vein. The south vein is given over to different parties of lessees from the 800-foot level to surface. It is stated that the shaft, which is 1450 feet deep at present, will be sunk deeper as soon as the new station pumps are put in.

At the Original mine sinking will be completed to the 1000 level in a few days, where a large station will be cut. From this point as well as from some of the large stations above, cross-cutting will then commence on an extensive scale.

The Clipper group of claims, at Pony, owned by Collins & Morris, employs twenty-five men doing development work. This number will be increased when the weather and roads improve, so that ore can be hauled to the company's 20-stamp mill at Pony.

Inter-Mountain: The Anaconda Company will this year start up the Union Consolidated silver properties northwest of Walkerville. Some of the machinery has already arrived and new buildings will be erected. It is understood the shafts in the property will be developed to a great depth and that the product of the mines will be used for fluxing purposes at the smelter.

W. A. G. Birkin, who worked the Pennington group of mines at Pageville with poor success during the past year, has bonded the Clear Grit and Sunrise mines in the Mayflower district from Knight brothers and Jesse Johnson, in the alleged sum of $100,000, of which the small payment of $750 is to be made down.

The deal for the transfer of the Mayflower group of mines near Norris, was consummated this week in Butte between A. G. MacDonald of Norris, and Frank J. Turner and J. J. Broughall of Butte, by which the latter acquire full title. The properties show sufficient development to warrant the erection of a mill in the near future.

IDAHO.

Spokesman-Review: At Camp Jerome the Early Bird Mining Company are preparing to sink an additional 100 feet on their property.

Placer mining is being carried on rather extensively at present, while the snow is on the mountains.

WYOMING.

One hundred mining locations have just been made for a St. Louis company at the head of the Popo Agie river in Lander county. The locations cover a field of cement, which contains gold in paying quantities. The deposits were found three years ago and since that time numerous tests have been made of the ore, with favorable results. The St. Louis company will develop the property on an extensive scale.

A dispatch from Otto states that C. W. Forester and W. H. Page, who have been prospecting near the mouth of the Big Horn canyon, report finding an immense ore body carrying gold. No lead has been discovered, the ore, which appears to be a granite formation, lying on the surface in a blanket over a territory half a mile wide, extending from the foothills to the top of the mountain. The granite is not very hard and the ore can be taken out with picks. The discoverers have forty tons out ready for shipment when the roads are in condition to allow it. The ore is said to be of like character to that found at Ragged Top, the new Black Hills camp.

COLORADO.

Republican: At Cripple Creek the Bull Hill tunnel is to be started up by a new company to be formed on the mutual investment plan. A compressor plant is to be put on, and the company purposes subleasing the several veins that have been cut by the tunnel in its completed length of 900 feet.

Overproduction is the cry heard everywhere now. As a sample, the Florence works have more than 2000 tons of ore on hand, and it was given out ten days ago that they did not want any more rock for some days still to come. The works at Gillett have a steady supply from producers under contract, and for a year or more have not gone into the market. The Brodie plant last week refused to purchase 300 tons, and again refused a lot of double that size. Miners have an idea that there is something of a preconsidered plan on the part of the mill men in refusing ores, so that an advance in treatment charges can be made. An informal gathering of some of the big producers was had on April 17th to examine into this matter. It was contended that present prices afford ample profit, and any raise in price would meet with opposition. There was also some talk of subscribing toward the construction of another mill that should be run upon a co-operative basis.

In the Goose Creek district a mill is to be erected to work ores of low grade.

Lind & Anderson shipped fifty tons to the mills this week from their lease on the south end of the Dante, and are in shape to keep up the production at this rate.

The St. Louis tunnel, being run into Tenderfoot hill from the head of Spring creek, at 300 feet from the mouth has cut a wide phonolite dike that gives assays up to $10 a ton.

The machinery for the Pony Express is being placed in position and will soon be ready for work.

Since taking the old Blue Bird shaft back from the lessees the company is getting out ore at a good rate and shipping an average of fifty tons a week.

Work has been resumed on the Golden Gate tunnel, being run by the company of the same name into Raven hill from the head of Squaw gulch.

At Ouray in the Gustan in Red Mountain district two weeks ago the vein of good ore averaged from 1⅛ to 2 feet in width, and since then it has been growing wider, until now the width of 9 feet is being worked.

The O. and N. tunnel has lately developed a larger body of ore, and this will necessitate the addition of a larger force being employed.

W. C. Newell will start the new machinery plant on his Grouse mountain tunnel tomorrow, and expects to push the bore with three shifts and two air drills.

The Santa Rita has disclosed a new ore chute in a drift run 100 feet south from the 250-foot level. The ore is eight inches in width, and from assays shows an average volue of $100 a ton.

At Aspen in the San Jacinto the ore uncovered last week forms a body 8 feet wide and runs from 125 to 250 ounces silver to the ton. The lessees, Brown and Caley, anticipate putting three shifts to work immediately.

The Melton mine, near the Lead King has been working steady all winter, and while no rich strikes are reported they are producing a fair grade of copper and lead ore.

The Inez is the only mine in the district that has been pushing development work with improved machinery. The principal work on this mine has been in driving a tunnel to strike the Black Queen contact on Sheep mountain. They are now in over 1,000 feet, and all indications point to a near approach to the ore.

The Mollie Gibson mine is now pushing work on the thirteenth level south to connect with the Argentum-Juniata, and is doing considerable work north of the Silver King shaft and making regular shipments.

The Argentum-Juniata continues to make steady shipments of sixty tons of 100-ounce ore.

At Lake City James Lindsey let a contract for driving 400 feet of tunnel on the Superior and Worldbeater at Carson camp.

Superintendent W. Arnold of the Aliunde Consolidated Mining Company reports that all the levels are being extended on the Colorado Central mine westerly into virgin ground, all showing more or less ore.

Orson E. Clark is having a group of mines developed in East Argentine district that produce silver and gold.

The Dubois Tunnel Company has let a contract to drive their tunnel 150 feet at $18 per foot. This tunnel is now in the hill 436 feet.

The Rico smelter, idle for two years, is to be remodeled and constructed on the plan of the Walsh smelter at Silverton.

NEW MEXICO.

Silver City *Enterprise*: The Santa Rita camp has been a steady copper producer during the past eighteen months. Until within the past two months most of the product was derived from assorting the old dumps, some of which were thrown out by the Spaniards a century ago. The Driscoll Mining Company has twenty-three men now employed assorting these dumps. Some of the ore found is very high grade, containing a large proportion of native copper.

J. B. Gilchrist is producing and shipping to the reduction works about 200 tons of copper ore per month from his leased property, the Chino and Guadaloupe claims.

Mayfield and Baker are developing their property adjoining the Santa Rita Company's mines, and are extracting and shipping sufficient copper ore to pay for development work.

Brunswick and Manzanares, of Las Vegas, are making preparations to work their placer claims on an extensive scale. These mines are located on Whitewater. The mines have been worked intermittently for twenty-eight years past.

At Pinos Altos five shafts, each 1000 feet in depth, are to be sunk immediately by the recent purchasers upon the Mina Grande and Ohio mines, and (three shafts upon the Pacific vein) one on the claim formerly owned by the Pacific Gold Company, one on the Pacific Extension, and one on the Pacific No. 2.

The Treasure Mining Company is remodeling its mill upon the Atlantic mine.

ARIZONA.

The mines and reduction works of the United Verde Copper Company at Jerome are at present employing over 500 men and handling approximately 400 tons of ore a day. The principal shaft is about 500 feet deep and from different levels tunnels have been driven, and the underground workings are extensive.

Reports come from Casa Grande that the copper mines twelve miles south of that place are improving fast. Mr. Hanover, formerly of Globe, is superintendent. These claims were bonded by Messrs. Mayhew, Stiles and Ulloa, some months ago, to St. Louis parties for $50,000. Development work was commenced immediately and a smelter is now to be constructed.

Phœnix *Republican*: The Old Dominion has been closed down a week. This is already felt by the merchants of Globe, but no one entertains a suspicion that such a condition will prevail for an extensive period. Freight teams are still engaged in hauling coke and wood, and twenty-five men are retained at the mines. Mr. S. A. Parnall, secretary of the Old Dominion, says he has instructions from Boston to say nothing in regard to the company's plans, but also received a dispatch from one of the members at Chicago saying he might disclose the reason for the suspension of operations, but prefers to remain quiet until further instructions reach him.

At the United Globe nearly 250 men are working at $3 a day in the mines and at the company's smelter.

The Middle March Copper Company has been formed to prosecute work in the Dragoons. It is understood the company intends beginning active work on their property shortly.

The Dragoons are receiving much attention from prospectors, and the results are very encouraging. Several copper propositions have recently been uncovered.

The Montezuma Mining and Milling Company will work gold claims in the Huachucas belonging to Henry Forest.

Scientific Progress.

Making Large Diamonds.

Consul Germain of Zurich, Switzerland, writes as follows of Moyat's claims of making large diamonds:

Diamonds of a very small size have been produced artificially heretofore, but no one has as yet succeeded in producing large ones. Mr. E. Moyat claims to have discovered a new process by which to produce diamonds of large dimensions. In principle, his process is about the same as the one already invented by others, and that is to obtain crystallized carbon out of iron and coal, by means of high pressure and high temperature. Yet there is some improvement in the Moyat process as regards the technical operation. Pulverized coal, iron chips, and liquid carbonic acid are placed in a steel tube and hermetically sealed. The contents are then subjected to the action of an electric arc light by means of two electrodes introduced into the tube. The iron liquefies, is then saturated by part of the pulverized coal, at the same time the liquid carbonic acid evaporates, thereby creating an enormous pressure on the mixture of iron and coal. This pressure again considerably increases the dissolution of the coal in the liquid iron. While the mixture is cooling, the carbon crystallizes partly in the form of a real diamonds and partly in the form of similar stones. These crystals are then segregated by dissolving the iron in diluted muriatic acid. The mixture, by the above method, remains under high pressure during the operation of the electric current, while by other methods the pressure is obtained later on only by means of the rapid cooling process of the crucible.

THE by-products of the Pittsburg Gas Works, says the *Post* of that city, pay the expenses of that profitable establishment, and leave its receipts for gas clear gain. Concerning by-products of other industries, it is said that those of oil refineries are both profitable and valuable; and the molasses of beet sugar, once considered and treated as comparatively of no account, now supplies very considerable quantities of potash and alcohol. Oleic acid, a residue of stearine making, is now utilized in soap making. The mother water of salt works furnishes much useful material; the soapy liquor in which raw wool has been washed is made to produce large quantities of grease, known as "Rheims grease," for soap making, and, in fact, nearly half the weight of some fleeces is of a substance which, treated with an acid, gives the Rheims grease.

THE researches and experiments of Messrs. Broca and Richet have led them to the conclusion that the cerebral nervous system is incapable of perceiving more than an average of ten separate impressions per second. After each excitation of the nerves a period of inertia follows, lasting about one-tenth of a second, and during this period a new impression cannot be made. According to the same authority, a person cannot make more than ten, or, at the most, a dozen, separate voluntary movements of any kind in a second, although the muscles, independently of the will, are capable of making as many as thirty or forty.

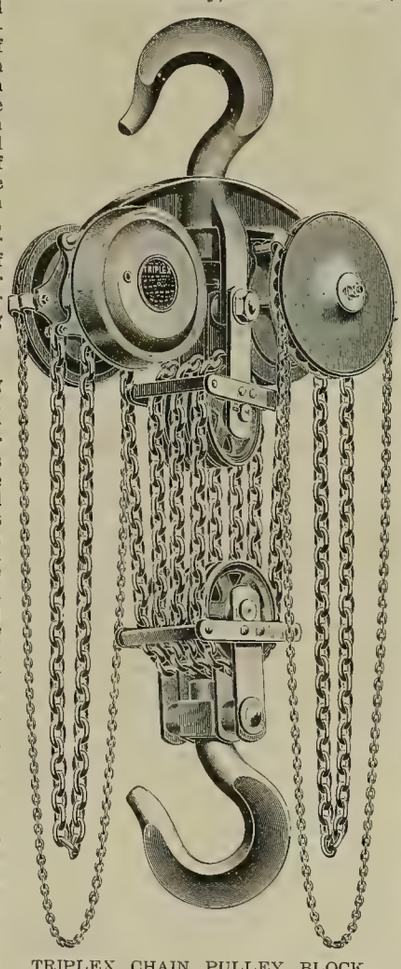
PLATINUM is pre-eminently the metal of the chemist, both in analytical and industrial operations. No chemical laboratory is complete without a varied assortment of platinum apparatus, and fortunes are annually invested in platinum retorts for the commercial concentration of oil of vitriol. Chemical operations alone consumed until within a few years the bulk of the metal produced. The dental and electrical industries are said at present to consume, in the United States alone, more than half of the world's supply of platinum. In the manufacture of artificial teeth platinum pins are used to fasten the porcelain teeth to the supporting plate during the process of baking the porcelain. Platinum is the only metal available for this purpose because of the high temperatures required.

FOR years manufacturers of brass and bronze castings have been greatly troubled with the apparently unavoidable tendency of copper to become porous when put in the mold. Practical foundrymen have long discussed this tendency, which has been made important by the fact that it is quite a drawback in work for electrical purposes. Various alloys have been tried, but these all injure the purity of the casting. It is now announced that Edison is paying some attention to the subject, and experiments in this line are now being made in Pittsburg.

Mechanical Progress.

Triplex Chain Pulley Block.

When the Triplex chain block was first introduced a report was published of tests made by Prof. R. H. Thurston, of Cornell University, to determine the



TRIPLEX CHAIN PULLEY BLOCK.

relative mechanical efficiency of various types of chain blocks in use, showing it developed an efficiency of 79.5 per cent. Two new sizes of the Triplex block have recently been produced capable respectively of handling loads of sixteen and twenty tons. The accompanying illustration shows the design of these blocks. The construction consists in placing a yoke on the upper hook, each end of this yoke carrying a Triplex mechanism of two tons capacity and each mechanism being operated by an independent hand chain. The two slack ends of the hoisting chain are attached respectively to the two Triplex hoists. The first loop of this chain then passes around the driving sheave in each hoist and thence over two sets of intermediate sheaves, one set carried in the frame of the bottom hook and the other set in the frame connected directly with the shank of the upper hook. The number of parts of chain is such that the maximum load on each part does not exceed two tons. In like manner the maximum load on each hoist is limited to two tons, and this is the limit of load carried by each arm of the yoke. All the remainder of the load is suspended directly from the shank of the upper hook. Still greater compactness and from 18 to 20 inches additional headroom can be obtained by omitting the upper hook and crosshead and building the block into the trolley of a hand crane or overhead tramrail system.

The Compression of Air for Power.

TO THE EDITOR:—In planning for the compression of air, the first thing should be to select that air most suitable for the purpose. Ordinarily this is given no attention, and the air is drawn direct from the engine room, which is very injurious, as such air is rarefied by the heat from the boilers and engine, steam pipes, and so on. Vapors of escaping steam and dust particles are generally abundant, hence air should not be drawn from the engine room, but from some cool and clean place. The north side of a building is generally shaded, and near the eaves is as free from dust as any place to be found. The air can be led under the floor in tight conductors, which should be made of such material as is a non-conductor of heat. And at times of the year when water can be had of a cooler temperature than the air it is a good idea to subject the air to a very fine spray, which will assist to cool the air as well as to wash out fine dust which might be drawn in. Air should be drawn in the cylinder as cool as possible, and this is secured only by admitting it in a solid, undivided mass. And for this reason the ordinary poppet valves are open to much objection, as such valves are closed by springs, and to insure closing at all speeds the springs must have considerable strength; hence it shows a great resistance to the inflowing air and deprives the operator of the power he should have. While we do find now and then a machine which has a mechanical valve which works similarly to the famous Corliss valve, which works very perfectly and gives a free, unobstructed inlet, in my experience I find the mechanical valve the only one suitable for air compressors, not showing any favors to special builders. Again, I find people using water in their air cylinders, which is very injurious, and which no man will allow if he understands the compression of air, as it robs the owner of power and is an injury to his machine. To be sure, we have some makes that have no water jackets and have no other means of cooling; but if you have such you had better throw them away, as they are a bill of expense. And, again, the lubrication of air compressors does not receive the attention it should. We find some using oils that are gummy and gritty, some of low test, and so on, with no thought, apparently, as to the proper amount. An oil which might do quite well on steam is not suitable at all for air. Get an oil of a high test, solid body, free flowing, and free from any gummy or mineral substance. ENGINEER.

Angels, Cal., May 1st, '97.

Gas Engines for Mining.

While the manufacturers of gas engines located east of the Rocky mountains are waiting to be educated up to the fact that they are producing machinery that can be used to great advantage in mining operations, their competitors on the Pacific slope are busy turning out engines for almost all kinds of mining service. The western manufacturer, in his enterprising work for expansion of trade, has realized the fact that there are many instances in mining practice where a gas engine makes an efficient and cheap power producer. It is true that he has comparatively near him many mines at which steam engines would be very expensive on account of the cost of fuel, but the eastern manufacturer has the advantage of more nearby mines in which gas engines can be used to advantage at parts of the workings where steam is impracticable and compressed air and electricity cannot compete on account of higher cost of installation. Besides, the eastern manufacturers of gas engines can get almost, if not quite, as low freight rates to many of the mines of the Rocky mountain regions as can their Pacific slope competitors. It is true that many mining men look on the gas engine with suspicion. They treated compressed air machinery in the same way, but both of these have won a big place in the mining industry. It is sheer nonsense to say that a gas engine is as efficient and cheap as a steam engine at coal mines, where fuel is cheap and power must not be conveyed long distances under ground, but even at many coal mines there are points in the workings where pumping and haulage must be done mechanically, and while the amount of coal available is considerable, it is not large enough to warrant the installation of either steam, compressed air or electric machinery, even if the use of steam is practical.

To sum the matter of gas engine service up, we append the following list of cases in which they will be found both economical and efficient:

For hoisting, hauling, and pumping from dip workings distant from the main openings; for running isolated ventilating machinery, and for isolated pumps for water supply at mines not equipped with electrical plants, and where the installation of an electrical plant would be inexpedient.—Colliery Engineer.

Electrical Progress.

The Future of Electro-Metallurgy.

John B. C. Kershaw has completed a series of articles in the London *Electrician* on the present development of the art of electro-metallurgy, and in the last speaks of the most probable lines of future development.

In his resume he shows that in all branches of electro-metallurgical activity Germany and the United States have a large lead—Germany having 38 and this country 37 establishments, all told, engaged in this branch of industry, with England 27 and France 18. If the value of the product were considered instead of the number of establishments, the United States would stand easily first with a large margin to spare. In the electrolytic production of copper this country has double the number of establishments credited to Germany, and nearly as many as all other countries combined, and in output it largely exceeds of all the others.

As to the future of the copper industry, Mr. Kershaw thinks that an enormous expansion would follow the general adoption of bimetallism.

As for aluminum, he believes that it must remain an electro-metallurgical product, but that the sulphide may replace the oxide as an ore.

He thinks the aluminum industry is already established upon a firm basis and bids fair to be a permanent one. He thinks it is handicapped, however, in competition with other metal by the fact that it is much weaker than steel and dearer than copper and brass. He looks to a cheapening in the cost of production and an improvement in the purity of the commercial article as being vital to any great expansion of the industry.

Of the future of the alkali and bleaching compounds he is not very certain. Rival chemical processes already in the hands of powerful trade organizations will be strong competitors, if not successful ones, of the electrolytic methods.

The manufacture of chlorates by electrolytic methods, he considers, has a bright future, and that they will eventually supplant the chemical methods. Electrolytic gold and silver recovery, he also thinks, will in the future be the method most employed.

The production of zinc, sodium and potassium must, he thinks, be the result of electrolysis in the future rather than of purely chemical methods.

The Hermite sanitation process, he thinks, will not survive, since deodorization, and not sterilization, is alone

effected thereby, and this is not enough.

The production of ozone, however, by silent electrical discharge he regards as a permanent industry, and hydrogen gas as a by-product in electrolytic methods will receive more attention if a use for that gas is found.

But perhaps the brightest future as cast by the horoscope is that in store for the electrolytic white lead industry.

THE "telescriptor" is the name given to a recent invention, for which is claimed the power of transcribing messages sent over a line, the object of the invention being to furnish expeditiously a permanent record of such messages as are ordinarily sent by 'phone. It is claimed that the scheme can be applied to existing telephone systems, so that, for example, a correspondent in San Francisco wishing to communicate with his Sacramento office would simply call up the Sacramento end on the 'phone; then, by switching the circuit over on to the sending apparatus, which is described as being in the form of a typewriter, and operated in the same manner, he writes out his message, which is printed at the Sacramento end. The specific advantages claimed are that the message is furnished in permanent form, and communication is much more expeditious than by telegraph, since it is direct, there being no delivery at a central office and subsequent handling by messenger boys.

A Great Mining Triumph.

Capt. J. R. DeLamar, of New York City, is one of the largest owners and workers of Gold Mines in the world. After the most careful investigation he purchased in August, 1895, two Griffin Mills, and his report is so remarkable as to demand the careful attention of every one interested in Gold Mining.

We give it in his own words.

NEW YORK, Jan. 9, 1896.

BRADLEY PULVERIZER CO. *Gentlemen:*—The two Griffin Mills have been in operation now for 90 days on the hardest rock, with the exception of corundum, that I have ever met during my mining life. They have taken the rock direct from the breaker and they average about 25 tons to each machine, 40 mesh fine, without elevating or bolting. We simply put a ¼ mesh screen around the Griffin Mill, and the stuff comes out 40 mesh fine or over, which makes it an excellent pulp for leaching by cyanide or chlorination, therefore we have concluded to order **10 more Griffin Mills**. We have tried high-speed rolls and dry stamps, and after looking into the Huntington Dry Pulverizer, the Natrod Pulverizer, the Stedman Pulverizer, the Frisbie Laeger, the Cook, and various other dry pulverizers, unhesitatingly recommend your Griffin Mill to any one.

Yours truly, (Signed) J. R. DeLAMAR.

HOW 10 GRIFFIN MILLS WORK.

DeLAMAR'S NEVADA GOLD MINING CO.,
SALT LAKE CITY, UTAH, Nov. 24, 1896.

BRADLEY PULVERIZER CO. *Gentlemen:*—In answer to your inquiry as to what the "Griffin Mill" is doing at our DeLamar Mill, DeLamar, Nevada, we beg to state that we often run 410 tons per day with 10 of your mills in operation, and on one occasion these 10 mills produced 408 tons in one day. I have no hesitancy in stating that they will regularly produce at least 30 tons per day each on our ore, which is extremely and unusually hard.

Yours very truly, H. A. COHEN, *General Manager.*

These strong letters coming from such representative men are conclusive evidence that we are right in claiming that the "Griffin Mill" will produce a larger amount of finer pulp at less cost than any other stamp or pulverizer made.

Let us send you a free copy of our illustrated pamphlet, which will tell you all about the Mill and bring to you other evidence of its great achievements.

BRADLEY PULVERIZER CO., 92 State St., Boston, Mass.

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Situations Wanted.

Expert Chemist, Assayer, Surveyor, (leaving college) understands mill work, cyanide process, smelting ore, etc., wants place. Salary secondary. Address "Miner," 518 Third Street, Oakland, Cal.

Experienced Physician and Surgeon
Wants engagement with mining company. Sixteen years' experience. Strictly temperate. Address "Bellevue," this office.

PROPOSALS FOR CANAL.

Sealed proposals will be received at the office of the Southern California Power Company, Redlands, California, until May 15, 1897, for the construction of 3¼ miles of canal, on the north side of Santa Ana river, from the mouth of Bear creek to the mouth of Keller creek, San Bernardino county, California.

The work is mostly through granite rock and consists of tunnels, flumes and trestles. Over two miles of the distance is through tunnels ranging from 100 to 1600 feet in length. There are twenty tunnels in all.

Contractors may bid on the whole or any part of the work. Plans and specifications can be seen at the office of the company, or they will be sent by mail upon application if desired. Satisfactory references must be given by bidders as to their responsibility, and as a guarantee that a contract would be entered into, providing the bid is accepted. The company reserves the right to reject any and all bids.

SOUTHERN CALIFORNIA POWER CO.
By HENRY FISHER, President.

Well Boring Wanted.

Proposals are invited from those having suitble tools, for sinking one to ten prospecting holes in cobble and boulders to bedrock, from two hundred to three hundred feet deep.

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Five-Stamp Mill with Rock Breaker and Two Concentrators.

All in First-Class Condition. F. o. b. steamer at San Francisco or Puget Sound.

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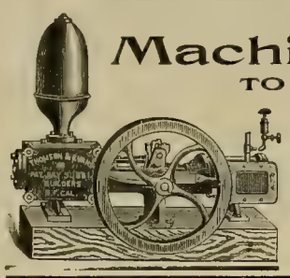
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PRICES UPON APPLICATION.

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THE EDISON GOLD SAVING MACHINE.

The Most Complete Machine in the World for GRAVEL WASHING.

Guaranteed to Save Every Particle of Flour and Flake Gold, and Floured Quicksilver.

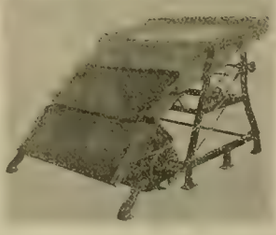
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Minimum power and water required. Requires but one handling of gravel. By motion of machine water is returned and used over and over again. Light, durable and easily transported. Simple in construction and inexpensive.

The EDISON MACHINE COMPANY,
PRESCOTT, ARIZONA.

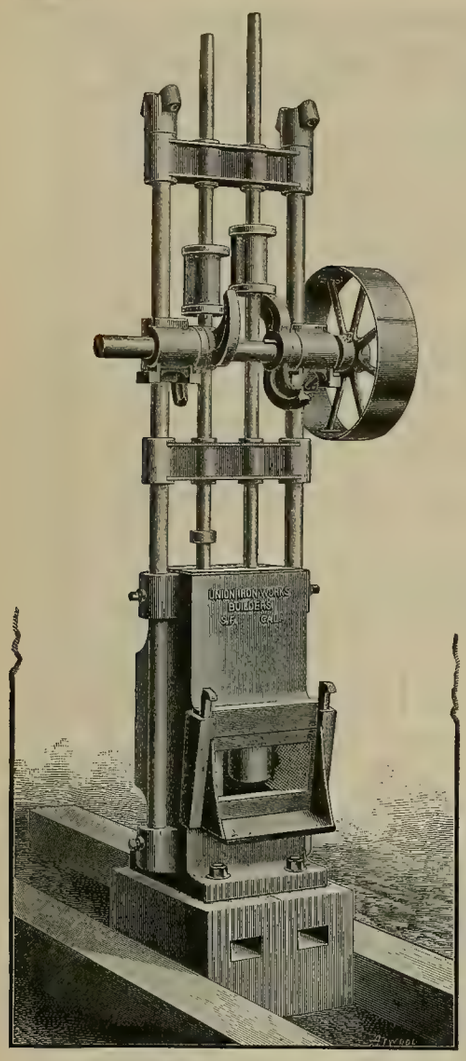
PACIFIC AMALGAMATOR

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A GUARANTEE WITH EACH MACHINE.

This machine is the finest gold saver for both placer mines and quartz mills. No other plate necessary in mills where the Pacific Amalgamator is used. THE PACIFIC MINING MACHINERY CO., 127 First Street, San Francisco, California.



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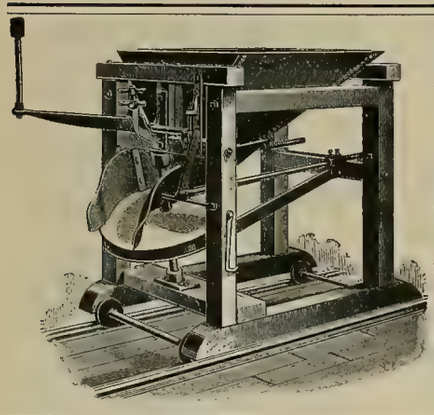
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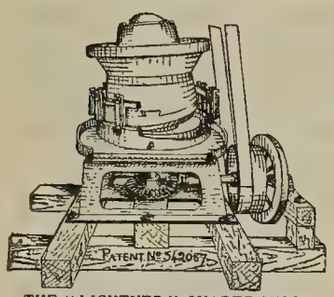
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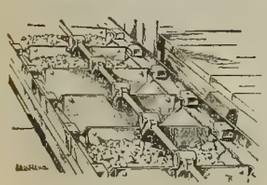
No. 2 MILL == 3 TONS CAPACITY, 1 1-2 H. P., = = $225.

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Coast Industrial Notes.

—The Pacific Sheet Metal Works of this city have established a branch plant at Los Angeles, Cal.

—The S. F. and Yokohama Transportation Co. is the name of a new steamship line to be put on between this port and Japan.

—The California Powder Co. has bid one dollar a pound on a proposed government contract for 40,000 pounds smokeless powder.

—At Gallup, N. M., on the 3rd, was sold the Atlantic & Pacific Railroad for $12,000,000 to the Atchison, Topeka & Santa Fe R'y Co.

—The Los Angeles Board of Education asks the City Council for $337,900 for new schoolhouses or additions to the present buildings.

—U. S. senatorial action on the tariff seems to make certain the fact that citrus fruits, wool and hides will be scheduled in the tariff bill.

—The Los Angeles Water Company is reported willing to sell to the city for $3,000,000. The city engineer reports that to develop a new system would cost about $4,500,000.

—Several hundred men find present employment on the sixty miles of railroad now building along the south bank of the Columbia river from Astoria, Or., to Goble, there connecting with the N. P. R. R.

—Canadian salmon canners in British Columbia claim that the proposed Canadian duty of one-half a cent per pound on fresh salmon will make them move their plants to the State of Washington. Forty-five cannery men, employing 2500 fishermen, are now doing business in British Columbia.

—In the new tariff bill as handed in from the Senate Committee the drawback on tin is retained. All coal is subjected to a duty of 75 cents per ton, except that it shall be 60 cents per ton on coal imported from any country that does not impose higher rates of duty than those named in the tariff bill.

—On the Valley railroad the grading on the Visalia route as far as Reedley is completed, and grading commenced below Kings river. Tracklayers have finished their work to Kings river. Surveyors are at work in the Tejon Pass, where it is reported that a road from Mojave to Bakersfield, Cal., to connect the Santa Fe and the Valley road will be begun.

—The Mexican Land, Navigation & R'y Co. is the name of a new corporation in the City of Mexico with $1,000,000 capital, with nearly all the stock in the hands of Pearson & Son of London. The proposition is to drain the valley of Mexico, and build a railway "from some suitable point on the National Tehuantepec road to a desirable point in the State of Vera Cruz."

Recently Declared Mining Dividends.

The Ontario Mining Company, Utah, $15,000; payable April 30th.

The Gold Coin Mines Company, Colorado, $20,000; payable May 1st.

Idaho, British Columbia, $25,000; payable April 26. Total to date, $175,000.

Reco, British Columbia, $50,000; payable May 1. The total to date is $187,500.

Le Roi, British Columbia, $25,000; payable April 30. The total to date is $375,000.

Pennsylvania, Grass Valley, Cal., 5 cents per share; payable May 5.

Personal.

JAS. D. HAGUE has returned from New York city.

GEO. E. AMES of the Union Iron Works is back from a business visit to the City of Mexico.

LEO VON ROSENBERG of New York is in Colorado on professional business. Later he will visit the Pacific coast.

J. O. HARRON, general manager of the Parke & Lacy Co., is making an extended business visit to Central America.

CAPTAIN J. W. PINDER, who has lately been appointed engineer in charge of the Gold Creek, Nevada, placers, is in San Francisco for the purpose of purchasing machinery.

C. W. FIELDING, one of the directors, and Mr. Wright, who will succeed Alexander Hill who has resigned the management of the Mountain copper mines of Shasta county, will soon arrive at Keswick, Cal.

Recent California Mining Incorporations.

Dardanelles Cons. Mining Company, Auburn; L. L. Chamberlain, B. B. Deming, C. A. Bilkey, C. Tuttle and E. F. Wright; capital stock, $100,000.

Clover Flat G. M. Co., Eureka; capital stock, $6400—all subscribed.

Salmon River Belcher M. Co., Yreka; capital stock, $500,000—$300,000 subscribed.

Winona Mining Co., S. F.; capital stock, $100,000; $25 subscribed.

Commercial Paragraphs.

THE Fulton Engineering and Shipbuilding Works have a contract for a new hoisting plant on the north shaft of the Kennedy mine, Amador Co., Cal.

W. H. EMANUEL, Denver agent for the E. P. Allis Company of Milwaukee, and for the Rand Drill Company, Chicago and New York, says: "During the past thirty days I received more inquiries about machinery than during the same period of time for the past five years, and have made more sales than we have made in the same time for many years. I think the trade in mining machinery during the next six months will be the heaviest in the history of Colorado."

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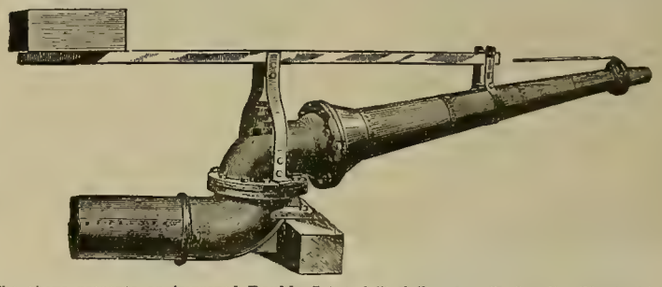
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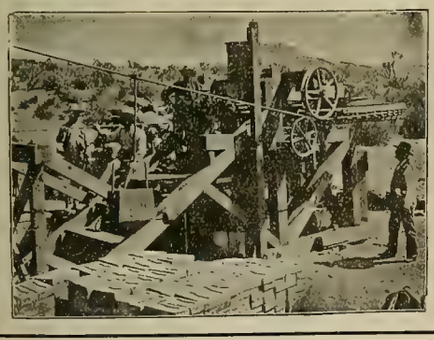
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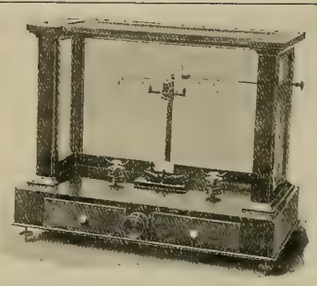


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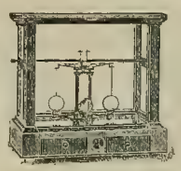
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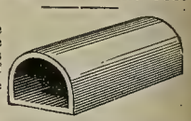
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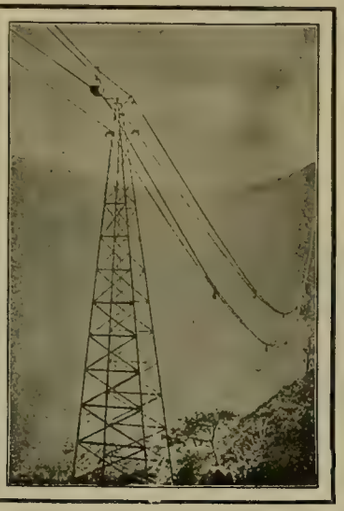
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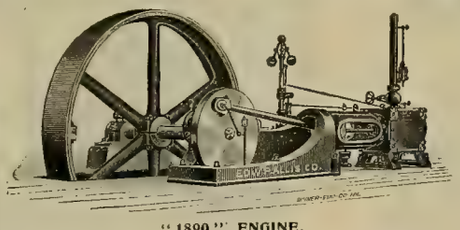
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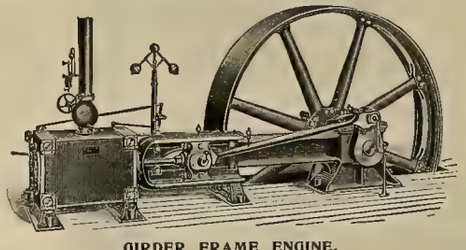
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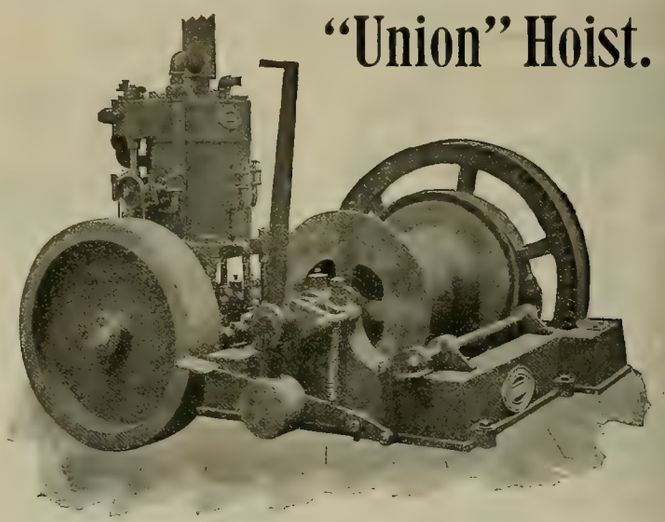
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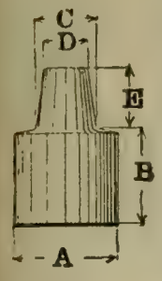
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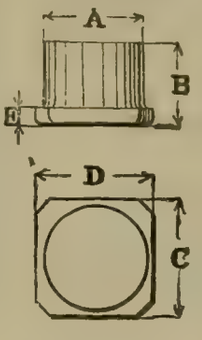
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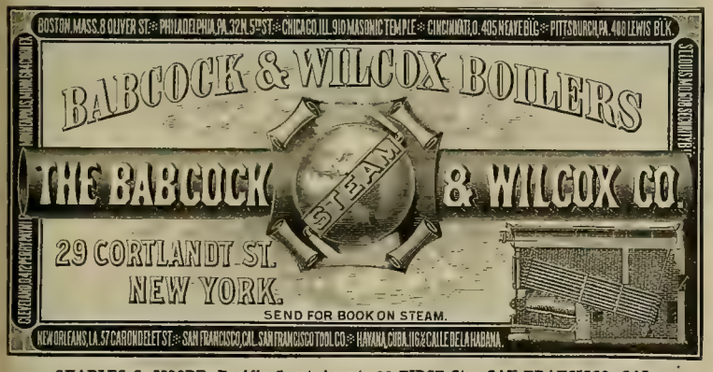
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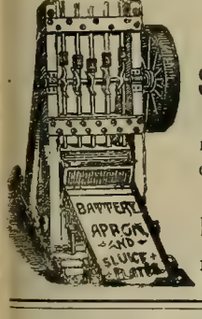
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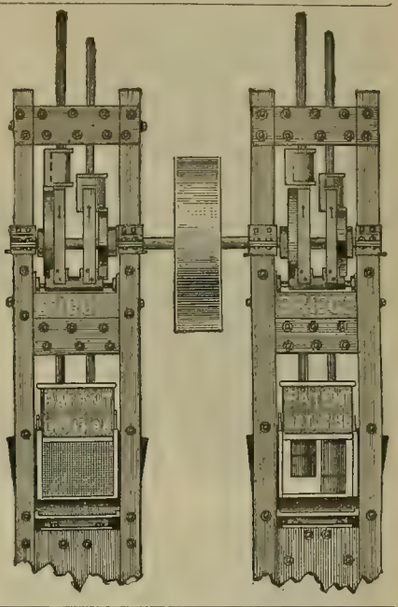
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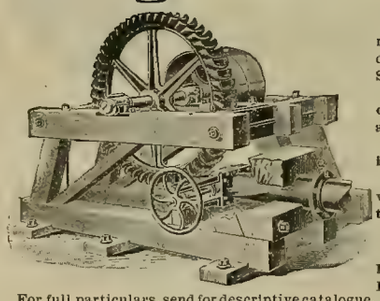
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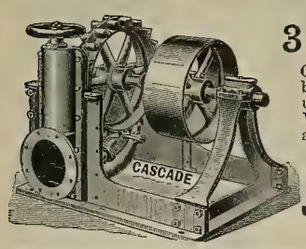
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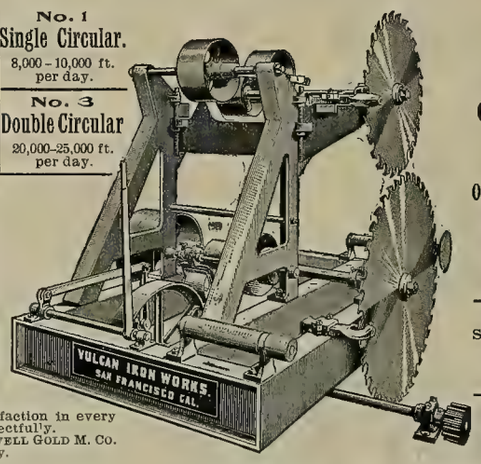
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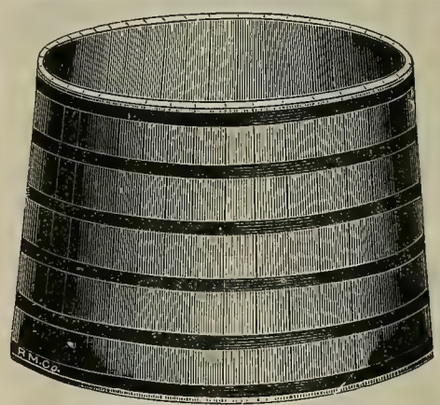
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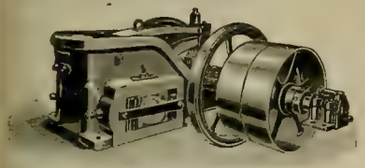
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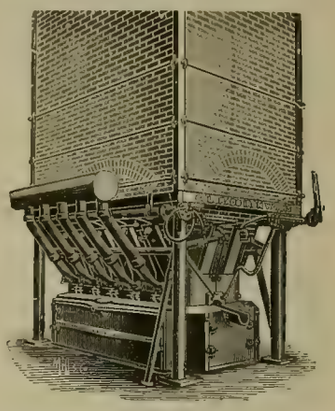
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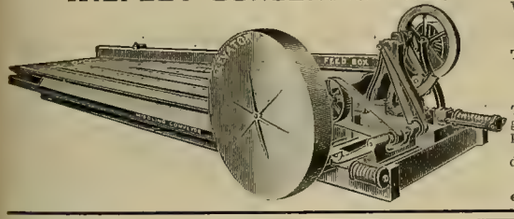
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ASPEN, COLORADO, April 8, 1897.

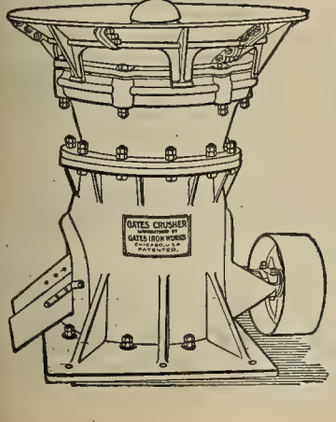
The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Your favor of the 5th inst. at hand and noted. In regard to the Wilfley Table I wish to say that I consider it to be the best device in use to day for concentrating fine ores; that it will save everything that a gold pan will; that it combines the clean saving of a Rittinger with the capacity of a buddle. I think that without question it will supplant in time all other devices for handling fine and slimy ores. This includes all the vanning machines and buddles. This is higher praise than I am in the habit of giving, but I feel sure that it is deserved, and you may make any use of this that you desire. Yours very truly,

[SIGNED] S. I. HALLETT.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

PRICE, $450.00.

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Market Reports.

The Markets.

SAN FRANCISCO, May 6, 1897.

General trade is reported only fair, not coming up to expectations. This is said to be due to tariff delay in Congress, causing a feeling of uncertainty as to the probable outcome and also when the bill will become law. The proceedings so far, in both branches of Congress, are convincing evidence that tariff legislation is controlled largely by sectional interests, and therefore it is difficult to forecast the bill that will finally pass. Until the business interests of the country see in what shape the bill will pass, trade and general speculation will be more or less lifeless outside of their normal conditions. The very heavy importations, with more to come, of foreign goods and raw material that will be affected by the tariff will hang as an incubus over the markets until the bulk is absorbed. Iron workers continue to report good business in structural and railroad material and also in machinery chiefly for mining purposes.

The local money market is practically unchanged. There is plenty available funds for city purposes but it is difficult to secure loans on country property. This it is stated will change when confidence becomes stronger and tariff and financial legislations are of the past. It is reported in well informed circles that at the next regular meeting of Congress the monetary system of this country will come in for legislation. If these reports prove to be correctly founded then there will intervene another period of uncertainty. Remittances to the East are not quite so heavy and with our fruit crop coming in the premiums or eastern exchanges ought to go down. Sterling bills are weak and lower in the absence of much of a demand. This weakness will probably interfere with gold shipments from Atlantic sea ports. These shipments aggregate nearly ten million dollars at last advises received. There were free withdrawals from the Treasury which reduced the reserve below $150,000,000, notwithstanding the extraordinary large sums held in banker's vaults. With us there is a continued enlarging demand for gold property. The buyers represent eastern and European capital. It is stated that both undeveloped and developed property is wanted, but chiefly the latter. Reports are current that three or four heavy transactions are pending with a strong probability that at least three will be closed at an early day. One of them is for an Arizona gold property. We are also informed that for the last year there has been some quiet buying of large silver producing mines—chiefly in Mexico. Advices from every gold producing district on this coast are quite encouraging.

New York Silver Prices.

NEW YORK, May 6. — Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	28 3-16	61⅝
Saturday	28 3-16	61½
Monday	28 1-16	61
Tuesday	27 15-16	60¾
Wednesday	27 15-16	60⅞
Thursday	28	61

	Copper.	Lead.	Iron.	Tin.
Fri	11 @11 25	3 20	10 00@12 50	13 30
Sat	11 @11 35	3 15	10 00@12 50	13 25
Mon	11 @11 25	3 20	10 00@12 50	13 20
Tue.	10 87½@11 12½	3 20	10 00@12 50	13 25
Wed	10 75 @11 12½	3 22½	10 00@12 50	13 20
Thur.	10 75 @11 12½	3 22½	10 00@12 50	13 20

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	10c Prem
New York Telegraphic Transfer	12½c Prem
London Bankers' 60 days	$4.87
London Merchants	$4.83
London Sight Bankers	$4.88¼
Refined Silver, per oz., 1000 fine	61
Mexican Dollars	49@50

SILVER.—The market sold down up to Wednesday, when a slightly stronger tone set in. The lower prices were induced by the light demand abroad and also the placing in London of Indian Council bills at lower prices. A further decline was prevented by a mintage order from France. This order, although not large, had the effect of bringing in other orders, which steadied the London market and caused it to sell fractionally higher. Freer shipments are being made from Atlantic seaports to Europe. The last steamer for the Orient took out $110,000 in silver bullion, of which $97,000 was for Bombay and the remainder for Hongkong.

MEXICAN DOLLARS.—The market continues dull at quotations. The last steamer for Hongkong took out 13,362 dollars in Mexican and 23,750 in sols.

QUICKSILVER.—The market is strong at an advance of 50 cents. About all the odds and ends have been cleaned up, both here and in New York. Shipments by water the past week to Mexico aggregate 120 flasks. The Senate tariff bill reduces the import duty.

Our market is quoted at $40.50 for domestic consumption.

COPPER.—The markets at the East have continued to shade off, with selling orders for future delivery reported on the New York market at less than ruling for spot. The production in this country seems to be in excess of the consumptive demand, notwithstanding it is increasing in this country and continues quite heavy abroad. The consumption on this coast shows an increase. Sheet and bolt can be shaded on quotations.

The local market is quoted as follows:

Ingot, jobbing	—@14
Ingot, wholesale	—@13
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17

TIN.—The market is weak at quotations for both pig and plate. The bulk of the demand is over for the season. The East reports a weak market for pig at the decline, owing to the lower price for silver bullion.

We quote as follows in a jobbing way:

Pig, per lb	14c@ —
Plate, I C coke, heavy, per box	$4 00@ 4 15
" " " light, "	3 90@ —

LEAD.—The market, in sympathy with the East, is lower. Corroders are using more both here and at the East, but the available supply is ample for all requirements. It is said that concessions can be had on our quotations.

Our market is quoted in jobbing lots as follows:

Pig	4 00	@	4 25
Bar	—	@	4 50
Sheet	5 62½	@	6 12½
Pipe	4 87½	@	5 37½

SHOT.—There is a fair jobbing demand.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

POWDER.—An active demand is reported from the mining camps, which keep the factories running to full capacity.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

BORAX.—There is a continued fair shipping demand. By the last steamer for New York via Panama the shipments aggregated over 85,000 pounds.

The market is quoted as follows:

Refined, in carload lots, in barrels	5
Refined, in carload lots in sacks	4¾
Powdered, in car lots	5
Concentrated, "	4½

IRON.—In our market the consumption continues heavy, with some shading in price. The East reports the markets unsettled with Southern furnacemen fighting for a stronger footing in the Northern and Central States. In this they are favored by reduced railway freights.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—The market is practically unchanged. Shipments to arrive are in excess of the corresponding time last year, but this does not appear to affect prices, which continue steady.

ANTIMONY. — The market is weak and quiet.

Our market is quoted at 7¼@8¼c in a jobbing way. New York mail advices quote 7½c for Cookson's, 6¾@7½c for Hallett's and 6¾@7c for Japanese.

NAILS.—The market is lower.

Wire, carloads, basis per keg	....
" jobbing, " "	$2 15
Cut, carloads, " "	....
" jobbing, " "	2 05

PLATINUM.—There is a fair demand.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC. — The market is quiet at steady prices.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is easy.

We quote in jobbing lots at 50 cents per pound for ingots.

Chemicals.

The market for nearly all kinds is unfavorably affected by free imports, owing to fears of increased duties. The uncertainty regarding the bill has an unfavorable effect. From New York our advices are as follows:

Crude brimstone is a shade easier, with unmixed seconds offered at $19.50 on spot and $19.25 to arrive, and thirds about 75c less. Chlorate of potash, yellow prussiate of potash and oxalic acid were reported to have been sold at a fractional concession from the prices generally quoted, and the market for these as well as for some other chemicals appears weaker under the influence of late heavy arrivals. Nitrate soda on spot met with fair sale at $1.90 in lots of 1000 bags, and $1.92½@1.95 in smaller quantity. Future shipments are still quoted at $1.75@1.85, according to position. No changes of importance were noted in prices of other chemicals, and the business passing is of very ordinary character all through.

SPELTER—There is a fair movement at a shade lower quotations. Our Eastern advices state that smelters avoid selling competition so as to enable the combine to maintain prices.

We quote our market in a jobbing way at 5 cents a pound.

BISMUTH.—There is a slow demand.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is weak at quotations.

We quote in a jobbing way at 70 to 75 cents per pound.

BONEASH.—The market is firmer with a good export movement.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is easy at 2½c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is steadier at $1.70 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a light demand at 2½c a pound from stores.

NITRATE OF SODA.—In our market there is nothing new to report.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is weaker at 6 to 12c per pound from store for carboys, according to make.

SULPHURIC ACID.—The demand is slow and market easy at quotation.

We quote in a jobbing way at 1½c per lb for 66%.

NITRIC ACID.—Our market is reported steadier from store at 6½c per pound in carboys.

BLUE VITRIOL.—Our market is easy.

We quote in a jobbing way at 4½c per pound.

Mining Share Market.

SAN FRANCISCO, May 6, 1897.

The market continues to act as if it is under strong manipulation, with Con. Virginia in the north end and Confidence in the Gold Hill group the leaders. The former has been making steady advances since it sold down to about $1.05 a share. After each upmove it has not fallen back to the lower figure from which it moved, except once, when it touched $1.50 twice; but the last time it did so the price advanced to over $2.50 a share. The remainder of the list sympathized, particularly the shares of adjoining mines. The shares of the middle shares, under the lead of Chollar, advanced in sympathy, but when it came to falling back they seemed somewhat demoralized. The writer is informed that there is still lacking a feeling of confidence with the public. Chronic traders follow the market by buying when signs of strength are in evidence, and sell when the market looks top heavy. A large majority of persons who gave attention to the market deal in wheat futures, owing to the better opportunity of making quick turns, while the moneyed public do not operate, although a large class of them glance over prices to see if there are indications of a deal. With these, and we might say with the large majority of business men, a genuine deal would be hailed with undisguised favor, but little deals of a few dollars do more harm than good. It has been the history of the mining share market that when the shares of any mine was advanced to $40 or $60 a share and under active trading, general business and speculation revived. Whether we will ever witness such figures again is a disputed point with outside traders, but there is one thing quite certain, they are not likely to come while the general business and financial conditions of the country continue at present low ebb. Experience has taught that there must be active trading at higher fluctuating prices at speculative centers in securities dealt in before a successful large-sized deal in mining shares can be carried out. The public have been upset too much already for it to come in at high prices, even with the showing up of a good-sized body of ore, unless they become crazily enthused by seeing free speculative movements at the East in railroad and industrial securities, and also improving business with merchants and manufacturers.

The news from the Comstock mines continues to report active work in several mines, but in other mines it is being prosecuted in a half-hearted, kill-time kind of way. So far as can be learned, the work is not calculated to show up a large body of ore, at least not at this stage of the game. What may be done later, it is stated, depends largely on whether the conditions favor a good-sized deal in mining shares. Attention centers largely on the work in Con. Virginia on and around the 1650-foot level towards the Ophir line. This attention is doubtless the more marked owing to a double compartment shaft having been sunk there, and experience has taught that this is done only when everything warrants the belief of the existence of a good-sized ore body. The last official letter filed in this city confirms the statement made by the MINING AND SCIENTIFIC PRESS that they had got into 4 feet of high-grade ore. The superintendent writes that the average assays were $200 a ton, at the time he wrote his letter, in the face of the upraise from the 1650-foot level. He also wrote that a good quality of ore was showing north and south in the upraise. At other parts of the mine active work is still the order, with some degree of interest being centered on the 1000-foot and 1550-foot levels. They extracted and raised last week forty tons of ore, assaying over $137 to the ton. Advices from Ophir state that they are still prosecuting work on the 1000-foot and Central Tunnel levels. They run through streaks of low-grade ore- In working west on the 1000-

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied.	Delinq't and Sale.	Secretary.
Brunswick Con G M Co, Cal.	11	3c	Mar 22	Apr 23..May 15	J Stadfeld
Bullion M Co, Nev.	50	10c	May 4	June 8..June 28	R R Grayson, 331 Pine
Channel Bend M Co, Cal.	7	2c	Mar 22	Apr 24..May 17	J P Langhorne, 39 Sutter
Crown Point G & S M Co, Nev.	70	20c	Mar 24	Apr 28..May 19	James Newlands, Mills Building
East Best & Belcher, Nev.	5	15c	Mar 25	Apr 26..May 13	E W Sichel, 337 Pine
Eureka Con D M Co, Cal.	8	5c	Apr 2	May 15..June 5	D M Kent, 330 Pine
Golden State M Co, Idaho	1	1½c	Mar 29	May 1..May 17	E Logan, 101 Van Ness
Gould & Curry S M Co, Nev.	81	20c	Apr 29	June 1..June 22	Alfred K Durbrow, 309 Montgomery
Gray Eagle M Co, Cal.	46	5c	Mar 30	May 8..May 29	W J Gurnett, 308 Pine
Hale & Norcross S M Co, Nev.	111	10c	Mar 20	Apr 23..May 14	R R Grayson, 331 Pine
Horseshoe Bar Con M Co, Cal.	7	10c	Mar 8	Apr 17..May 8	D M Kent, 330 Pine
Jamison M Co.	9	5c	Nov 27	Apr 24..June 19	Sam W Cheyney, 120 Sutter
Marguerite G M & M Co, Cal.	6	10c	Apr 12	May 24..June 21	F Mettmann, 237 Twelfth
Overman S M Co, Nev.	77	10c	Apr 12	May 17..June 7	Geo D Edwards, 414 California
Savage M Co, Nev.	92	20c	Apr 13	May 17..June 7	E B Holmes, 309 Montgomery
Seg Belcher & Mides Con M Co, Nev.	19	5c	Apr 6	May 10..May 29	E B Holmes, 309 Montgomery
Sulphur Bank Q M Co, Cal.	5	25c	Mar 23	May 3..June 3	T Wintringham, 306 California
Tenabo M & M Co., Nev.	1	50c	Mar 29	May 4..May 24	T J Read, 606 Sutter
Thorpe M Co, Cal.	6	2½c	Apr 14	May 22..June 13	A F Frey, Phelan Building
Union Con M Co, Cal.	1	10c	Mar 18	Apr 22..May 10	J M Fletcher, 320 Sansome
Union Con S M Co, Nev.	54	20c	Apr 7	May 11..June 1	A P Swain, 309 Montgomery

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foot level of Mexican they continue to pass through streaks of quartz giving low assays. In Union the work is to the east on the 900-foot level. In Sierra Nevada they are still going east from the Layton Tunnel level. In the east crossdrift in Utah they pass through clay seams and lines of quartz. In the joint east crossdrift of Best & Belcher and Gould & Curry, from the 800-foot Bonner shaft level, last advices stated they were in soft porphyry. As this is said to be favorable, it would seem to be about time to stop the work. In Savage no change is reported in the work or material encountered. No work is being done in Chollar. In Potosi they are still prosecuting work on the tunnel level. No change is reported in the work in Bullion and Alpha. The long west crossdrift run jointly by Con. Imperial, Challenge and Confidence is being pushed slowly ahead. No change is reported in the material run through. There is some interest manifested by the more experienced miners in the west crossdrift that is being run by Yellow Jacket, Kentuck and Crown Point. From the latter mine nothing new comes to hand, but so far as that is concerned, the same remarks can apply to the work in Belcher, Seg. Belcher, Overman, Caledonia and Alta. No mention has as yet been made of the ore strike reported to have been made in the first two mines some time ago. It looks as if they are still after shares of the mines in that end, and to officially report an ore strike or to give particulars regarding work would probably interfere with the game.

From the Brunswick lode we are not advised of any material change in the general situation since last week's review. The joint work of Con. Virginia, Best & Belcher and Gould & Curry is being closely watched to see if the ore found farther north extends to these mines. The impression prevails that it not only does, but it will be found richer and in larger quantity, when desired by the inside pool. In Savage they encountered every indication of an ore vein, but the work was either stopped or else turned. In Chollar they have about completed erecting a new boiler. When this is down, work will be resumed in Savage and also in Chollar on the 600-foot level. On this level a south drift will be run. They are still stoping ore in the 200-foot and 400-foot levels. On the 300 foot level the work is largely exploiting, as it is on the 500-foot level. Over 200 tons of ore were raised last week, assaying over $22 in gold and 20 ounces of silver to the ton. The work in Occidental is confined to the same levels and directions reported last week. The material encountered does not show any essential change.

The following illustrates the changes of the week:

MINES.	Apr. 29.	May 6.
Alpha	.....	.....
Alta Consolidated	$ 07	.....
Andes	24	$ 24
Belcher	39	.....
Best & Belcher	73	64
Bodie	.....	.....
Bullion	08	.....
Challenge	.....	.....
Chollar	1 10	83
Confidence	1 15	1 30
Consolidated California and Virginia	2 00	2 15
Consolidated New York	03	.....
Crown Point	34	.....
Exchequer	.....	.....
Gould & Curry	39	31
Hale & Norcross	90	.....
Justice	.....	.....
Mexican	52	43
Ophir	1 15	1 05
Overman	05	06
Potosi	66	52
Savage	23	21
Sierra Nevada	59	52
Union	27	30
Utah	.....	.....
Yellow Jacket	28	31

San Francisco Stock Board Sales.

SAN FRANCISCO, May 6, 1897.

9:30 A. M. SESSION.

100 Chollar	83	100 Ophir	1 05
200 Con Cal & Va	2 15	500 Overman	05
100 Confidence	1 30	100 Potosi	52
500 Mexican	43	800 Sierra Nevada	52
300 Occidental	18	530 Union	30

SECOND SESSION—2:30 P. M.

100 Ophir	99	200 Yellow Jacket	31
600 Gould & Curry	31	100 Overman	06
150 Best & Belcher	64	250 Union	24
400 Con Cal & Va	2 05	150 Caledonia	15
300 Savage	21	100 Occidental	16
200 Chollar	82	100 Andes	24
100 Potosi	51		

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from the Industrial Gold Mining Co., in the Old French Mine near Indian Diggins, El Dorado Co., to deposit tailings in Cedar Creek; from James Rooks, in the Messerer Mine near Spanish Ranch, Plumas Co., to deposit tailings in Spanish Creek; from the Haskel Ravine Mining Co., in its mine in Mohawk Valley, Sierra Co., to deposit tailings on a flat; and from Costa, Davis & Co., in their mine at Cherokee, Butte Co., to deposit tailings in an old pit; gives notice that a meeting will be held at room 59, Flood Building, San Francisco, Cal., on May 24, 1897, at 1:30 P. M.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Charles and Ben Howlett, in the Howlett claim, near Columbia Hill, Nevada Co., to deposit tailings in Knapp Ravine, and from the Marguerite Gravel and Quartz Mining Co., in the Marguerite Mine in Eureka Mining District, Nevada Co., to deposit tailings in a ravine, gives notice that a meeting will be held at Room 59, Flood Building, San Francisco, Cal., on May 10th, 1897, at 1:30 P. M.

STOCKHOLDERS' MEETING.—Notice of Stockholders' Meeting of the Steeple Rock Development Company: In accordance with a resolution passed by the Board of Directors of the Steeple Rock Development Company, a meeting of the stockholders of this company will be held at 3 o'clock in the afternoon on TUESDAY, the 11th day of May, 1897, at its principal office, No. 320 Sansome street, room 24, San Francisco, California, to consider and vote upon a proposition to increase the capital stock of this company to Two Million Dollars, in four hundred thousand shares, at the par value of five dollars each.

H. PICHOIR, Secretary.

Dated at San Francisco, Cal., March 26, 1897.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

581,040.—BOTTLES—W. C. Barrett, Portland, Or.
581,162.—INK FOUNTAIN—J. E. Bartel, Astoria, Or.
581,451.—REFINING ASPHALTUM—A. F. L. Bell, Carpenteria, Cal.
581,416.—SPRAYING APPARATUS—G. A. & R. F. Dunn, Dinuba, Cal.
581,552.—DOOR FASTENER—M. W. Greer, Menlo Heights, Cal.
581,500.—SASH LOCK—W. T. Gregg, Lodi, Cal.
581,426.—TOY—B. E. Henriksen, S. F.
581,589.—FOOTSTOOL—S. C. Houghton, S. F.
581,530.—FLY TRAP—Isberg & Bergquist, S. F.
581,506.—FURNACE—H. Lang, Oakland, Cal.
581,425.—GOLD-SAVING DEVICE—J. Mait, Oakland, Cal.
581,360.—COOLER FOR PISTON RODS—M. L. Merz, Chico, Cal.
581,431.—COOLER FOR ICE MACHINES—R. F. Schroeder, Sacramento, Cal.
581,439.—AERATING FLUIDS—R. G. Sneath, S. F.
581,444.—BICYCLE BRAKE—W. & W. S. Valentine, Lewiston, Cal.
581,401.—GANG PLOW—E. H. Wagener, Modesto, Cal.
26,999.—DESIGN FOR FURNACE—J. G. Ills, S. F.
26,965.—DESIGN FOR BADGE—J. A. & G. A. Montgomery, Los Angeles, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

APPARATUS FOR COOLING, AERATING AND EVAPORATING FLUIDS.—Richard G. Sneath, San Francisco, Cal. No. 581,439. Dated April 27, 1897. This invention relates to an apparatus which is especially designed to cool, aerate or evaporate fluids such as water, milk, cream, salt brine, saccharine water, or any other liquid which can be thus operated upon. The invention consists of a sluice having a perforated bottom, a closed chamber beneath the sluice, a passage through which air is supplied to the chamber under pressure so that the liquid flowing in the sluice is constantly acted upon by jets of air passing the perforated bottom, this chamber having a trap or seal at one end to prevent the escape of air and having a discharge passage at the bottom of the air receiving end through which the liquid is delivered.

BICYCLE BRAKE.—William and William S. Valentine, Lewiston, Cal. No. 581,444. Dated April 27, 1897. This invention relates to an improved brake to be employed particularly in conjunction with bicycles so that the brake may be used without friction and injury to the tire. It consists of a groved disk securely fastened to the spokes of the wheel, a lever adapted to fit into the groove of the disk and so fulcrumed to the fork of the machine that by means of a connecting rod and compound lever upon the handle bar the brake may be applied at any time, the pressure of the shoe or lever in the grooved disk being sufficient to regulate the speed of the machine.

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Assessment Notices.

THORPE MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 14th day of April, 1897, an assessment (No 6) of 02½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 41 Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 23d day of May, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 14th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 41, Phelan building, San Francisco, California.

SEG BELCHER AND MIDES CONSOLIDATED Mining Company. Location of principal place of business, San Francisco, California; location of works, Gold Hill Mining District, County of Storey, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 6th day of April, 1897, an assessment (No. 19) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, No 309 Montgomery street, Room 50, Nevada block, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 10th day of May, 1897, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 29th day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

E. B. HOLMES, Secretary.

Office—No. 309 Montgomery street, Room 50, Nevada block, San Francisco, California.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9), of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 26th day of March, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on SATURDAY, the 24th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 19th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of April, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on MONDAY, the 24th day of May, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 19th day of July, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 12th day of April, 1897, an assessment (No. 6) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of May, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 21st day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

F. METTMANN, Secretary.

Office—237 12th street, San Francisco, California. Office hours from 5 to 6 o'clock P. M. The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

GOULD & CURRY SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of April, 1897, an assessment (No. 81) of 20 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 69, Nevada Block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of June, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 22d day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room 69, Nevada Block, No. 309 Montgomery street, San Francisco, California.

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This Engine can be operated on either Crude Oil, Distillate, Gasoline, or Kerosene. **It is the cheapest power on earth** and is not tied to any one kind of Oil, but can use any kind that will make gas and is not handicapped by being compelled to use a certain Oil. Do not forget this when in need of an Engine.

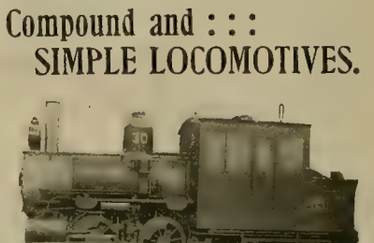
We guarantee our Engines to work perfectly on California Crude Oil, or Distillate, or any other kind of gaseous Oil; we however prefer CALIFORNIA CRUDE OIL, from Coalinga, Fresno county, for the reason that gas from Crude Oil will produce more power from the number of feet of gas used than from any other Oil, and it is also a natural lubricant as well, the valves being always lubricated sufficiently to prevent them from sticking, thus assuring greater durability of the working parts than it otherwise would be in using dry gas. And another advantage we claim is, that danger from explosions is reduced to a minimum, there being no accumulation of gas, but is used by the Engine as fast as it is generated and hence is absolutely safe. The following is a test that we made with one of our Five-Horse Power Crude Oil Engines, running ten hours on the different gas oils:

California Crude Oil, 40 grav	7½	galls. at	5c.	$.37½
Distillate	40	"	7½ "	8c. .60
Domestic Coal Oil	40	"	7½ "	12½c. .93¾
Gasoline	74	"	8¾ "	15c. 1.31¼
City Gas	1000	feet,		2.00

We manufacture all sizes from two-horse power up, and will guarantee that our Engines will run cheaper and are more simple in construction, have fewer parts and hence are more durable than any other Gas Engines on the market. Seeing is believing; don't take our word for it, but come and investigate for yourselves. You can always see one in operation at our works. We will be pleased to see you and will at all times take pleasure in showing them up. Our Engines are specially adapted for running well and mining machinery—in fact, for any kind of power desired. We are the pioneers and first inventors of Crude Oil and Distillate Engines. **We always lead and never follow.** Send for Catalogue and Price List of the only genuine Crude Oil and Distillate Engine made.

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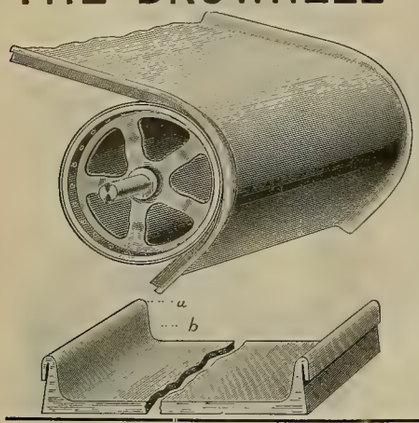


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It has taken years of ceaseless testing and experimenting to produce the superior belt which we now offer, with elastic flanges and pliable body reinforced with specially woven duck. Every belt is manufactured by experienced workmen, and carefully tested on machines especially built for that purpose; consequently we are to-day manufacturing the best belts that mechanical ingenuity, combined with honesty of construction, can possibly produce.

SUPT. OFFICE WILDMAN GOLD MINING COMPANY,
SUTTER CREEK, AMADOR CO., CAL., Feb 22, 1897.

MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: Replying to your favor of the 18th inst., will say that in the two mills operated by this company we have nineteen of your Patent Lip flange concentrator belts in use; some of them have been in constant use for the past two years and have given entire satisfaction. I know of no better flange for a side shake machine.

Yours truly, JOHN ROSS JR., Superintendent.

MEXICAN MILL, EMPIRE, NEV., March 28, 1897.

MR. J. S. BROWNELL, San Francisco, Cal.—DEAR SIR: For some years we have used three different styles of belts on our Frue vanner at the Mexican mill, and for smooth working and endurance the Brownell Patent Lip flange belt has proved its superiority over all others, and I unhesitatingly recommend it to all who are using Frue machines.

Yours truly, EUGENE MAY, Foreman.

For any information regarding Frue Vanner or Belts, call on or address

JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.

(Successor to Adams & Carter.) 132 MARKET STREET, ROOM 15, SAN FRANCISCO.

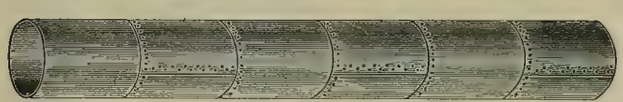
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Office and Works: Cor. Beale and Howard Sts., San Francisco.

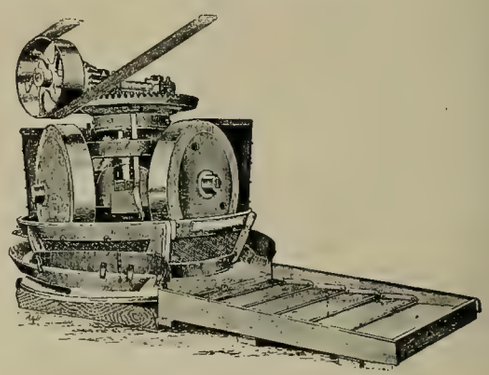
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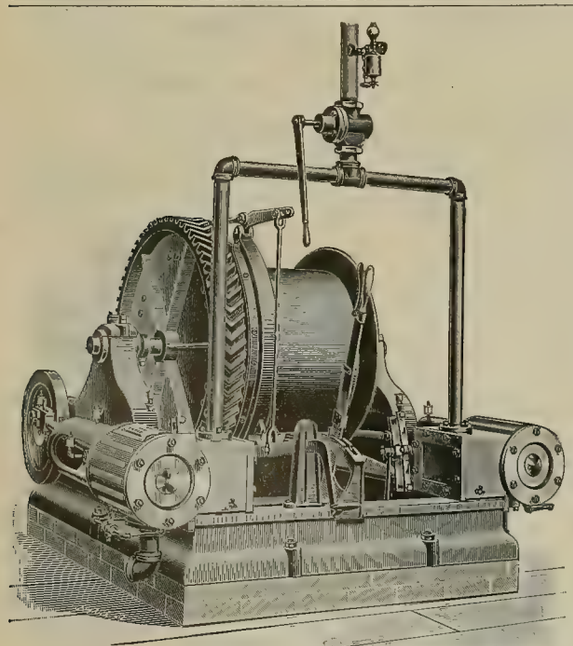
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Estimates Furnished for Complete Plants for Hoisting Works, Smelters, Concentrating and Stamp Mills.

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MINING AND SCIENTIFIC PRESS.

AND PACIFIC ELECTRICAL REVIEW.

No. 1923.—VOLUME LXXIV. Number 20. SAN FRANCISCO, SATURDAY, MAY 15, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

The Mining of Beach Sands.

The saving of fine gold in beach sand and in many other deposits inland has long been a problem with the gravel miner. In Humboldt county beach mining has been conducted since the early days almost without interruption, and almost invariably without much success. The failure to save the gold has been due mainly to the fact that the gold is "scaly;" yet year after year mines are being worked with old processes tried over again, or new methods. Often considerable sums are expended in exploiting new gold-saving devices.

Aside from the fact that the gold is nearly always scaly, and consequently washed down by the water to the sea and refuses to settle in the riffles, there is a very large proportion of black sand in the gravel. The specific gravity of this black sand is so great that it settles in the riffles, filling up the interstices; and after the first few hours, or in cases a few days' run, no gold can settle on this account. Black sand has often been found the cause of the great difficulty in saving fine gold where it was found in large quantities in other gravel mines in the interior.

It is often pointed out that exceedingly fine gold—as fine as one thousand pieces to one cent—is saved in the beach mines of New Zealand, and that therefore the gold in Humboldt county should be saved. It may be said in answer to this that in nearly all cases where the fine gold has been saved without much difficulty, it has not been of a scaly nature—that is, the particles, however small, have been in the shape of little nuggets.

In saying that all methods so far tried for saving scaly gold are failures, it is not meant that no gold is saved. Many of them save quite a percentage of the gold; but although beach mining has been carried on since early days and in many places, from Mexico to northern Alaska, it has been successful only in working the richer spots. No method has been found for working rapidly and saving at the same time such proportion of the gold as is usually saved in the hydraulic mines.

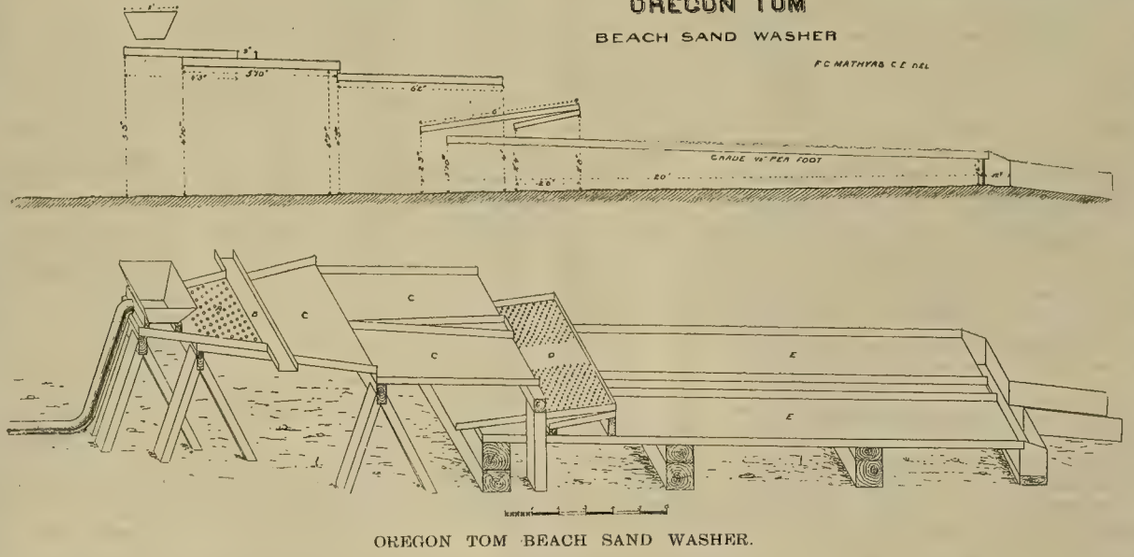
The immense deposits of beach sands often in high banks carrying large amounts of gold offer a large reward for any one who may discover a process for working them on a large scale. So far the most successful plants for working these sands have been modifications of the old-fashioned "toms," or other small sluices used for washing gravels. There are illustrated on this page two of these "toms," used on the Union mine in Humboldt county.



OREGON TOM, UNION MINE.



ORDINARY TOMS, WITH PLATES, UNION MINE.



OREGON TOM BEACH SAND WASHER.

In the northwestern part of Colorado, and in Wyoming are many thousands of acres of shallow deposits of sandy gravel lying upon clay bottoms and containing gold in paying quantity. These deposits have not been made by rivers, but are lacustrine. They vary in depth from 1 or 2 feet to as much as 25, but average about 7 or 8. In one district in Routt county over 100,000 acres have been located within the past four years. The gold generally is evenly distributed and exceedingly fine, actual count showing that the number of particles required to make one cent in value being over 1000 on an average. Yet of this gold a far larger proportion is saved than of the "scaly" beach gold, because it is in the shape of exceedingly small particles, showing that it has not been subject to the flattening process of most gold that has been moved far.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

Oldest Mining Journal on the American Continent.

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J. F. HALLORAN.....General Manager

TO THE PUBLIC.

No one is authorized to solicit business for this paper unless in possession of proper credentials and regularly numbered and stamped blank subscription receipts.

San Francisco, May 15, 1897.

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New Capital and Increase of Yield.

Estimates as to probable increase in the yield of mines in most districts are based, in nearly all cases, on the increased amount of work done, the increased amount of capital interested, or the increase generally in activity in the industry. The fact that the results of this work may not be apparent immediately is generally lost sight of. In California, during the past five years, a great deal of capital has been invested in mines and expended in development, which has not produced a dollar of bullion in return to the owners, and will not for some time. In Amador and Calaveras counties are over a dozen large mines, upon which work has been going on for years. Some are erecting mills, some are still sinking, and one or two, like the Gwin, have begun to crush ore. All told, upon these mines, nearly three millions of dollars will be expended before returns are made. The fact that for several years the expenditure of money in new ventures in California has been far out of proportion to the increase in the gold yield, instead of being a discouraging sign should be looked upon as evidence that the industry of mining is being developed carefully and conservatively, and that the increase of the gold yield will be healthy.

Even if many times as much capital as has been offered had been invested in mining in California during the past two years, the increase in the output of bullion would not have been in proportion.

There is always a tendency to make a stock job out of the mines in any district. Since the beginning of the increased activity in California mines all the conditions for such speculation have been unfavorable and the industry has been conducted mostly by small companies or individuals, upon business lines.

Into western Australia there was lately a very great influx of capital, yet the output of gold was very small. Through speculation a great many lost money but the mines are rich and the output in time will be very large. The attempt to open up the mines with a rush was a failure.

Mineral Product of California for 1896.

State Mineralogist Cooper has sent to the printer Bulletin No. 12 of the State Mining Bureau, giving by counties the amount and value of each of the substances mined or quarried in California in the year 1896. An abstract of the tabulated sheet shows the following division of products:

Precious Metals	$17,604,026 30
Metallic Substances (including the Precious Metals)	18,937,793 00
Non-Metallic Substances	1,415,993 00
Hydrocarbons and Gases	1,777,340 00
Structural Material	2,160,272 00

The total value is $24,291,398.

The following table gives the figures for 1895 and 1896:

ARTICLES.	Amount. 1895.	Amount. 1896.	Value. 1895.	Value. 1896.	Increase.	Decrease.
Antimony, tons	33	17	$ 1,485 00	$ 2,320 00	$ 835	
Asbestos, tons	25		1,000 00			$ 1,000
Asphaltum, tons	25,525	20,914	170,500 00	362,590 00	192,090	
Bituminous Rock, tons	38,921	49,456	121,586 00	122,500 00	914	
Borax, tons	5,959	6,754	595,500 00	657,000 00	78,500	
Cement, barrels	16,283	9,500	32,566 00	28,250 00		4,306
Chrome, tons	1,740	786	16,795 00	7,775 00		9,020
Clay, { Brick, M	131,772	24,000	672,360 00	524,740 00		147,620
Clay, { Pottery, etc., tons	37,660	41,907	39,685 00	62,900 00	23,215	
Coal, tons	79,858	70,649	193,790 00	161,335 00		32,455
Copper, pounds	225,650	1,992,844	21,900 00	199,518 70	177,618	
Gold			15,334,317 00	17,181,562 70	1,847,245	
Granite, cubic feet	288,449	182,261	224,329 00	201,004 00		23,325
Gypsum, tons	5,158	1,310	51,014 00	12,580 00		38,434
Lead, pounds	1,592,400	1,293,500	49,364 00	38,805 00		10,559
Lime, barrels	394,764	302,750	386,094 00	261,505 00		121,589
Limestone, tons	71,355	68,184	71,640 00	71,112 00		587
Macadam, tons	840,650	646,646	700,987 00	510,245 00		190,742
Magnesite, tons	2,200	1,500	17,000 00	11,000 00		6,000
Manganese, tons	880	318	8,200 00	3,415 00		4,785
Marble, cubic feet	14,864	7,889	56,566 00	32,415 00		24,151
Mineral Paint, tons	850	395	8,425 00	5,540 00		2,885
Mineral Water, gallons	701,397	808,843	291,500 00	337,434 00	45,934	
Natural Gas			112,000 00	111,457 00		543
Onyx, cubic feet	1,200	3,000	12,000 00	24,000 00	12,000	
Paving Blocks, M	2,232	4,161	73,338 00	77,584 00	4,246	
Petroleum, barrels	1,245,339	1,257,780	1,000,235 00	1,180,793 00	180,558	
Platinum, ounces	15	162	900 00	944 00	44	
Quicksilver, flasks	36,104	30,765	1,337,131 00	1,075,449 00		261,682
Rubble, tons	414,038	313,973	394,952 00	329,639 00		65,313
Salt, tons	53,031	64,743	150,576 00	153,244 00	2,668	
Sandstone, cubic feet	55,242	58,524	35,373 00	28,378 00		6,995
Serpentine, cubic feet	4,000	1,500	4,000 00	6,000 00	2,000	
Silver			599,789 70	422,463 60		177,326
Slate, squares	1,350	500	9,450 00	2,500 00		6,950
Soapstone, tons	25		375 00			375
Soda, tons	19,000	3,000	47,500 00	65,000 00	17,500	
Totals			$22,844,664 29	$24,291,398 00		

Total net increase, $1,446,734.

THE MINERAL PRODUCT OF THE RESPECTIVE COUNTIES, INCLUDING ALL SUBSTANCES MINED IN EACH, SHOWS THE FOLLOWING TOTAL VALUES FOR 1896 AND 1895:

COUNTIES.	1896.	1895.
Alameda	$ 230,630 00	$ 274,647 00
Alpine	400 00	
Amador	1,593,021 02	1,443,504 40
Butte	755,480 88	706,196 38
Calaveras	1,555,888 85	1,734,918 14
Colusa	14,584 00	440 00
Contra Costa	138,109 00	139,655 00
Del Norte	24,150 00	8,250 00
El Dorado	819,481 22	738,498 99
Fresno	85,884 60	52,049 00
Humboldt	308,546 85	356,221 20
Inyo	497,626 48	464,409 51
Kern	710,010 35	342,078 59
Lake	264,944 00	507,074 00
Lassen	40,300 00	25,000 00
Los Angeles	1,072,738 55	1,076,717 00
Madera	186,904 84	211,985 74
Marin	93,260 00	157,790 00
Mariposa	335,817 44	216,629 46
Mendocino		150 00
Merced	1,250 00	1,500 00
Mono	562,042 31	648,527 31
Monterey	1,000 00	
Napa	495,366 00	489,200 00
Nevada	2,292,160 42	1,795,391 16
Orange		4,144 00
Placer	1,735,750 55	1,677,527 32
Plumas	462,609 61	603,222 57
Riverside	355,598 00	378,155 00
Sacramento	189,288 00	211,497 75
San Benito	91,095 00	104,250 00
San Bernardino	1,003,889 80	1,114,863 30
San Diego	603,991 00	386,407 57
San Francisco	322,667 00	379,696 00
San Joaquin	120,157 00	102,800 00
San Luis Obispo	37,271 00	81,220 00
San Mateo	2,500 00	5,000 00
Santa Barbara	383,159 00	158,678 00
Santa Clara	318,415 00	445,950 00
Santa Cruz	239,199 00	254,776 00
Shasta	813,593 29	811,233 52
Sierra	786,598 27	694,576 63
Siskiyou	1,091,917 47	1,030,983 73
Solano	23,413 00	24,285 00
Sonoma	135,146 00	177,840 00
Stanislaus	18,435 00	30,081 50
Tehama	475 00	11,525 00
Trinity	1,435,366 30	1,305,412 41
Tuolumne	1,070,470 13	667,066 77
Tulare	25,752 00	18,820 00
Ventura	292,800 00	264,624 00
Yolo	378 00	1,873 00
Yuba	171,687 77	111,482 34
Unapportioned	380,200 00	395,340 00
Totals	$24,291,398 00	$22,844,664 29

It will be observed that the net increase of product of all articles was $1,446,734 and that the increase of the gold yield alone was $1,847,245.

The largest falling off was in structural materials, amounting to no less than $553,483. This was, of course, due to the small amount of new buildings erected on account of depression in business. Altogether, the mining industry makes a better showing than any other in the State. The decrease in the output of quicksilver does not show any failure in the product of the mines, which, it is well known, could be made to produce much more if the demand required it.

The better prices for asphaltum that have prevailed here have made a large increase in the value of the product, while the amount of output has decreased. As to petroleum, it will be seen that while there has been a very slight increase in the number of barrels produced, higher prices have prevailed and made it worth more than the output of 1895 by $180,558.

Of the articles in which there was considerable falling off are silver and lead. Much of this is due to decreased output of the mines on the western slope of the Sierra Nevada, in Inyo and San Bernardino counties.

The output of copper increased from 225,650 pounds in 1895 to 1,992,844 pounds in 1896, due mainly to the opening of the Mountain copper mines of Shasta county.

The Foreign Investor's Opportunity.

The mine owners in this State come in for considerable criticism, if not abuse, from promoters for asking prices that prohibit sales for their mines. The trouble is not so much that the owner asks more than the mine is worth, but that in asking simply a reasonable price for it he leaves the poor promoter no opportunity to pile on fees and commissions. Many of the large producing mines in California—nearly all of them, in fact—have been examined by experts for foreign capital within the past three or four years, but no sales have taken place. For many of them, offers have been made by the most reputable of foreign syndicates, looking for good investments. Generally speaking, they expect much less interest return beside the capital of their investment, and so are in a position to offer good prices. The fact that their offers have been declined is the best proof that the California miners have acquired faith in the permanency of their ore bodies in depth.

It would appear that the best opportunities for foreign investors in California will be for some time in taking hold of prospects and developing them. Unless they acquire more faith in the mines of the State faster than they have been of late they are apt to be left behind in the race by local capital.

It is noticeable that people from the Eastern money centers of the United States do not care for this kind of investment. When looking for mining property they generally ask only for mines that are developed and producing. They are very poor prospectors, and would rather gamble on something else. The Englishman is a born gambler, and only asks a fair chance for his money. However, he has been too busy playing Africans and Westralians of late to pay much attention to other districts; but as he needs a new field now, it is as likely as not that he will overcome his mistaken idea that Americans are too smart, and try California.

Concentrates.

In the oil fields near Florence, Colo., there are seven holes being drilled.

The Eureka mine at Murray, Idaho, has been jumped by a brother of one of the owners.

Press dispatches announce a strike in the Buckeye mines in the Pine Nut district, Nevada.

A suit involving the interest of some 500 people in town lots in De Lamar, Nevada, is on trial at Carson.

Books of the mining recorder at Bingham, Utah, show that there are over 9000 locations in the district.

In California gold nuggets the average percentage is said to be 88 per cent gold, and 12 per cent silver.

A nugget of gold weighing five pounds has been found in the Ybarra mines at Calamilli, Lower California.

California's "gold crop" for '96, commands the admiration of the world. It is a big advertisement for the Golden State.

C. D. Lane and associates have purchased an interest in the Eureka mine at Cerbat, sixteen miles north of Kingman, Arizona.

The Portland-Alaska Company at Berner's Bay, Alaska, is putting in a wire tramway 9200 feet in length with one span of 1263 feet.

The Point Loma oil well in San Diego county is down 1116 feet and the formation is said to be similar to that in the Los Angeles oil fields.

The Anglo-Mexican of Mexico, owned in London, reports for March the output: $40,390 bullion, $2040 concentrates, 3060 tons, 27 days' run.

The Chicago people who recently purchased the Vulture mine in Arizona, are preparing to erect a 100-ton cyanide plant to treat the tailings.

Leadville, Colo., is now daily producing 1000 tons of ore. Gold, silver and lead to the value of $200,000,000 has been produced from that great carbonate camp.

Last week in Boston a sale of 10,000,000 pounds of Lake copper was made at 11 cents by the Calumet & Hecla and other companies for May and June delivery.

The annual report of the Victor, Colorado, mine, shows that since the organization of the company the average cost of producing $1 worth of gold has been 37 cents.

In the deepest parts of the Grand canyon of the Colorado river are bodies of copper ore, but it is at present so inaccessible that little inducement is offered to exploit it.

In southern Oregon most of the hydraulic mines have closed down a month earlier than usual, but owing to better plants for working the season has been satisfactory.

Rev. J. H. Weber, assisted by three other divines, on the 6th inst., at Russell Gulch, Colorado, formally dedicated "to the Lord" the Bon Ton mine, and the proceeds thereof.

The deepest mine in Colorado is the Geyser, at Silver Cliff, in Custer county, in which the three-compartment shaft is timbered to the depth of 2425 feet perpendicular.

At Midway, in British Columbia, fifty claims were recorded last week. Into all the newer parts of the Kootenay country, and especially the east, hundreds of prospectors are going.

The owners of the Rawhide mine in Tuolumne county, Cal., are having experiments and tests made to determine whether to put up a concentrating plant or a cyanide plant of 100 tons capacity.

The Brickyard Mining Company is arranging to erect a mill on its property at Mercur, Utah. The leaching plant will have a capacity of 200 tons daily, and the stamps will be able to crush 400 tons.

The La Grange Hydraulic Mining Company, in Trinity county, Cal., is about to put in a siphon pipe line across Stewart's Fork, 2000 feet in length. The pipe will be 30 inches in diameter.

Ore producers in Utah have been notified by the railroads of a raise of $2.50 a ton on shipments to outside points. This makes the rate $9.50 to Denver and Pueblo and will seriously affect the industry.

The Calumet & Hecla, Mich., management propose sinking three shafts on the Osceola amygdaloid. James Hoaston, from Montana, son of the Calumet & Hecla's superintendent, will have charge of the work.

The trails to the Yukon placers are reported to be in most wretched condition, and a number finding the difficulties of taking their outfits in have turned back, selling their supplies for whatever they could get.

It is probable that the Le Roi mine, of Rossland, B. C., will soon pass into the hands of London people who have been trying to purchase it for some time. The price offered, according to one of the principal shareholders, is £1,000,000.

A contract has been let for the construction of the new plant of the Montana Smelter Company, at Twin Bridges, Montana, and it is expected to be ready for work within ninety days. Its capacity will be thirty tons daily.

A new Colorado law provides that a fee of $10 shall be charged all new corporations on capital of $50,000 or less. In excess of that fifteen cents shall be charged on each $1000 of capital. A similar law has long been ingeniously evaded in Montana.

The only cinnabar mine being worked under the British flag is at Lake Kamloops in British Columbia. It was opened last year, and a furnace with a daily capacity of thirty tons purchased in San Francisco has been erected and was fired up April 1st.

Felix Julian de Noraubert has brought suit in the United States courts in Denver, Colo., against Fred Beaudry to recover $32,500 commission for finding a purchaser for placers at Junction City, Trinity Co., Cal., purchased by a French company for $500,000.

Near Lovelock, Nevada, in Rabbit Hole district, the placer miners bring water through a seven-mile ditch and are sluicing gravel hauled by teams about a quarter of a mile, but on account of the scarcity of water they propose putting in a pump and engine.

E. B. Jennings of Table Rock, Jackson Co., Oregon, upon whose farm coal has been found, has bonded his property to capitalists who have paid $1000 down and agree to pay $50,000 if, upon sinking, developments are satisfactory. Preparations are being made to sink 800 feet.

A few days ago a member of the Colorado Springs Mining Stock Association was suspended for overcharging a client in a small amount, and at the same time three other members were expelled for cutting commissions.

The fifth annual convention of the Western Federation of Miners began in Salt Lake City, Utah, last Monday. The president of the Federation, Edward Boyce, of Wardner, Idaho, advised each union to organize a rifle club, and in two years thus have 25,000 armed men.

The report of the director of the mint shows that during the month of April the total coinage at the United States mints was $10,410,580. Of this amount $8,000,000 was in gold, $1,535,000 in silver, and $74,680 in minor coins. Of the silver coinage $1,400,000 was in standard dollars.

Morella, Mexico, reports that a copper mine near Ario, in the State of Michoacan, has been sold to English capitalists for $400,000 in gold, and that the Todos Santos gold mine, in San Jose de Garcia district, Sinaloa, has been sold to the Anglo-Mexican Mining Company for $82,000 in gold.

At Phœnix, Arizona, the Chamber of Commerce is at work on a proposition submitted by Charles E. Majors, representing capitalists of Rochester, N. Y., whereby the donation of 200 acres of land convenient to the Santa Fe and Southern Pacific railways will secure the building of a smelter.

The alien clause of the mineral land act has been defeated in the British Columbia Legislature by a vote of 13 to 12. The proposal to deny aliens the privilege of prospecting in the British Columbia mineral fields was intensely unpopular in the mining districts, and it was condemned by the government.

The annual report by the directors of the Tharsis Sulphur & Copper Company for the year 1896, shows that the total quantity of mineral raised at the Tharsis, Calanas and Lagunazo mines in Spain, during the year, was 557,557 tons (exclusive of 48,357 tons of cupreous sterile), against 612,483 tons in 1895—a decrease of 54,906 tons.

For the third time a portion of the dam built by the Ohio Gold Mining Company across the San Joaquin river, about three miles above Millerton, Cal., has been washed away. The dam was built to turn the stream through a channel constructed around a section of the river bed, where, it is believed, there are rich deposits of gold. In another month work of washing would have begun.

A London syndicate has purchased for $500,000 the group of mines composed of the Idaho, Alamo, Cumberland, Concentrator and Tramway, near Three Forks, B. C., from A. E. Humphreys, J. D. Farrell and M. D. Moore of Spokane and W. C. Yakeys of Detroit, Mich. These are mainly silver producers and the Idaho has paid to date $225,000 in dividends.

A law recently enacted by the New Mexico Legislature makes it impossible to do "lead pencil assessments" in that Territory, and this law will result in a good many locations changing hands at nominal prices. Ninety days will be allowed in which assessment may be done, and it is a misdemeanor, punishable by fine and imprisonment, to lap new claims on older locations.

United States engineer officers are in Colorado to select a reservoir site in that State, and will then go to Wyoming. The cost of construction will be paid by the Federal Government. It is believed that the Colorado reservoir site will be selected on the South Platte. The National Government will construct these two reservoirs, but the States must do the ditch building and furnish the water supply.

The Ferreira Company, one of the largest Rand, South Africa, companies, reports for the year 1896 that the quantity of ore crushed was 120,762 ton, which yielded 99,315 ounces of gold of the value of £355,031. The profit on the treatment of tailings amounted to £100,461, whilst the sum obtained by sale of concentrates amounted to £71,344. The cash profit for the year was £346,008 and £171,000 was paid in dividends.

The mining fever has reached the ministry in British Columbia. Rev. G. R. Maxwell, Presbyterian, is president of a mining company. Rev. F. Yolland, Revelstoke, is a mineral assayer. Rev. Father Emmeul is shareholder in a score of mines, and Rev. R. R. Maitland, the most prominent Methodist minister in the province, is to abandon the pulpit altogether and embark in mining.

The new Canadian tariff law admitting mining machinery free of duty is very broad. Following is the language of the special section: "Machinery of a class exclusively used and required for mining, smelting or refining purposes, and also all materials for the construction of such machinery in Canada to be free for that purpose—the whole to be subject to regulations to be made by the controller of customs."

According to the message of President Diaz, of Mexico, there were applied for 5800 mining titles under the new law of 1892 up to the end of 1896. Of these 2183 were in Sonora. The total exportations of mineral of all kinds, including gold, silver, copper, lead, coal, marble, etc., for 1896-97 reach $71,000,000. Of the nearly $6,000,000 of gold exported, Sonora furnished $3,227,338. The gold and silver production of Sonora for 1896 will show at least $6,743,980.

The Galt Company, in Montana, has an ingenious contrivance for protecting the mines against fire. A door of boiler iron has been placed in the tunnel, about 50 feet from its mouth, fixed with a weight to make it close automatically. A ¼-inch rope holds it open, being drawn through the main building outside and fastened where it can be cut at a moment's notice. This rope, in case the main building should take fire, will burn off, or be liberated with a knife, in time to close the door and preserve the air in the mine free from smoke. The miners can find easy exit through the other outlet.

The new mining law of Utah went into effect last Monday, and, as provided in the California law to go into effect May 26th, all locations must be recorded with the county recorders. The new Utah law provides that each corner shall be marked substantially, and that within ninety days after location $50 worth of work must be done. A determined opposition to this law has developed among the miners, and at a meeting in Silver City it was resolved to fight it in the courts, on the ground that it is in conflict with the Federal statutes.

The sixth report of the Ontario, Canada, Bureau of Mines states that there was an increase in the number of mining locations sold and leased of 218 acres, of lands sold and leased 13,685 acres, and an increase in receipts from sales and rentals of $22,644. During the year 22 charters were granted under the Ontario Joint Stock Companies act, the aggregate of their capital being $12,775,000. In the first quarter of the present year, however, 33 mining companies have been chartered, with a total capital of $26,665,000. With regard to the production of gold the remark is made that it has considerably increased, but that the encouragement lies mainly in the extent and promise of development work going on. Nickel and copper production was about the same as last year.

"Gilsonite" is so named after S. H. Gilson, of Salt Lake City. The mineral is also known as Uintaite. It is described as a variety of asphalt, H. 2-2½, Sp. G. 1.065-1.07; color black, brilliant and lustrous; streak rich brown; brittle fracture conchoidal; a nonconductor of electricity, but electrically excited by friction; fuses in candle flame, burns with bright flame like sealing wax, and like latter takes sharp impression from seal; by distillation gives off small quantity of white, dense oil, and some gas; dissolves in heavy oils and fats; soluble also in alcohol, but not readily in ether or turpentine.

Reports come from the Drum Lummon mine at Marysville, Mont., that the great old property is not exhausted, and that new ore bodies have lately been discovered. The mill has been closed down for some time at the recommendation of A. T. Bayliss, who lately resigned to take charge of the mining work of the Exploration Company. In the meantime the cyanide plant of 2100 tons daily capacity to work the old tailings is being put up, and exploration and development work is going on. To the mining industry all over the coast the success of old producers that have been reported worked out is of more importance than anything else in giving encouragement to capital.

The premier of Western Australia in a campaign speech lately which was mostly taken up with matters connected with the mining industry said: "During the last few months what is called a slump has been on in the market, which means that the people in England are not sending money out so freely as they were some time ago to carry on mining in the colony. But I am glad to say that the colony's good fortune has not forsaken it, for very rich discoveries of telluride and refractory ores have been made at Kalgoorlie. A parcel of 512 tons of this refractory ore was sent to the Dry Creek Smelting Works in south Australia some time ago, and returned 11 ounces to the ton, equal to £20,000, while another parcel of fifty tons from, I think, the Boulder Main Reef mine, some time ago, yielded 10 ounces to the ton."

United States production of copper for the first quarter of 1897 was 1229 tons larger than for the corresponding period of 1896. Exports of copper from this country for the first three months of this year were 2383 tons greater than during the first three months of 1896. From January 1st to March 31st, American production amounted to 118,135,360 pounds of fine copper, and exports to 66,615,360 pounds, so that the exports were equal to 56.38 per cent of the total production during the period mentioned. These heavy shipments effectually prevent any serious accumulation of stocks at this centre, and the distribution of supplies going to Europe from this and other sources, indicate a rapidity of absorption through foreign channels. The magnitude of European consumption continues to furnish the most vital support the market has. In the past two years the stock of Chili copper in Liverpool and Swansea has decreased 19,120 tons in the face of the enormous shipments from this country, and the stock of Chili now at those points is only 18,790 tons on May 1st, inst.

The report of the expert, C. W. Goodale, made to the reorganization committee of the Butte & Boston Company of Montana, last August, has been published by the Boston *News Bureau*. It shows that the amount of ore extracted from the Silver Bow mine up to the suspension of operations in February, 1896, was 601,665 tons. The percentage of copper was 8.47 in 1893; 6.12 in 1894; 4.14 in 1895; 4.69 in 1896, with mining cost figured at $3.78 per ton, which includes cost of exploration and developments. The ore in sight is placed at 45,000 tons, valued at $88,750, with a possible addition of $10,000 in undeveloped reserves. It is safe to assume that the valuable ore above the present bottom of the mine would yield at least $125,000 above all costs. From the Gray Rock group of mines shipments to the company's works have amounted to 172,593 tons, with percentage of copper 8.10 in 1893; 8.25 in 1894; 6.60 in 1895. Net value of ore in sight may be placed at $1.74 per ton on 16,909 tons, or $29,421, with possibility that under favorable circumstances this could be increased by $45,000.

The Supreme Court of the United States has handed down a decision in the Colorado case known as the Rico-Aspen tunnel case. The decision apparently settles the controversy, not only of that particular case, but between the tunnel-site owners and subsequent locators of veins along the line of the tunnel-site or on its territory. The decision of the Supreme Court settles the contention that a tunnel-site locator has the right to possession to every blind vein which crosses the line of the tunnel within 3000 feet of its face, which was not discovered when the tunnel was located; provided, that the tunnel-site owners have prosecuted the work on the tunnel with diligence. And the discovery of a lode or vein from the surface after the location of the tunnel will not deprive the owner of the tunnel of any part of the vein; and, provided further, that he has diligently prosecuted his work on the tunnel. The decision also settles the right of the owner of such tunnel to locate 1500 feet along the vein, and this location may be made partially upon one side of the point of discovery of the tunnel, or entirely upon one side.

The annual report of the New Elkhorn Mining Company for 1896 shows receipts from Leadville mines, £8238; Montana mines, £82,330; interest, etc., £114; total, £90,742. The expenses were: Leadville mine, £11,214; Elkhorn mine, Montana, £59,168; London office, £3709; taxes, etc., £578; total, £74,669. This left a balance of £16,073 profit. In their Elkhorn mine in Montana the work shows 99 feet shaft sunk, 129 feet winzes, 751 feet drifts, 267 feet crosscuts. The average cost per lineal foot was: Shaft, $26.11; winze, $7.99; drifts, $5.76; crosscuts, $7.32. The total rock raised from the mine was 13,330 tons, divided as follows: Dry ore, to mill, 11,513 tons; sold to smelter, 554 tons; second-class ore to dumps, 143 tons; surplus in stock, 166 tons; waste sorted out, 1454 tons. The ore sold to smelter showed by assay 85.6 ounces gold, 90,787 ounces silver and 149,367 pounds lead. The net value was $50,356, or $90.86 per ton. The mill statement shows 13,762 dry tons crushed and 13,718 tons panned, the stamps working 315.38 days and the pans 357.63 days. The average saving was 92.3 per cent. The average duty per stamp per day was 1.75 tons. The bullion product was 340 fine ounces gold and 486,721 fine ounces silver. The average price received for silver was 66.95c per ounce. This would give an average value per ton of ore crushed of $24.19. The cost per ton for mining was $12.39 and for milling $7.17, a total of $19.56, leaving a profit of $4.63 per ton.

Some Colorado Concentration Methods.

Written for the MINING AND SCIENTIFIC PRESS by PH. REARDEN, Superintendent Abbott Quicksilver Mining Co.

Among the many kinds of gold and silver ores of Colorado there are very few real free gold propositions. All run more or less, as depth is gained, into sulphurets, containing iron, copper, lead, zinc or tellurium, and occasionally metallic arsenic. Consequently the study and practice of concentrating these sulphides are growing very fast and with very satisfactory results. Almost all mills have some system of concentration, either below the plates or directly below the crushing machinery.

The writer has had some experience in the tellurides and sulphides of Boulder county and Cripple Creek, the gold-bearing sulphides of Summit and Gilpin counties, and the gold, silver, copper and lead-bearing sulphides of the San Juan, and has had practical experience with many kinds of bumping tables, shaking tables, Frue vanners (both smooth and corrugated), Woodbury vanners, Triumph vanners, Monell vanners, Lurig vanners, the Ogden table, and jigs of several varieties and circular revolving buddles. I find that in nearly all the mills that I have seen there is not enough importance given to frequent and perfect sizing of the product before it goes to the concentrating machines, and also a disposition to pulverize the ores far too fine, to make a close saving, as in the ordinary stamp mill. I cite an instance where, in a mill of which I had charge, I had been crushing with stamps through a 40-mesh battery screen and amalgamating. Our loss per ton ran from $2 to $4. We changed to 20 and then to 16-mesh, put in two hydraulic sizers, and the loss never exceeded $1.25 and was frequently less than 25 cents per ton, on the same ore as run through the 40-mesh screen. This ore was an iron sulphide carrying a small percentage of zinc. We saved by concentration about all the gold and silver that would not amalgamate. Our product always had less than 8 per cent silver and 8 per cent zinc and about 40 per cent iron in it; and smelters gave us rates as follows—10 per cent silica and 8 per cent zinc was the neutral basis: Smelting charges, $6 per ton, and also 15 cents per unit for silica in excess of 10 per cent, with a rebate of 15 cents per unit for iron in excess of silica, and charges of 50 cents per unit for zinc in excess of 8 per cent. Ours being a clean product, we were paid 15 cents per unit for 30 units of iron, which amounted to $4.50, which, deducted from $6, left total smelting charges of $1.50 per ton. We could mine and mill, with our capacity of 35 tons daily, ore that contained only $3.50 per ton in gold and silver. The entire expense of milling this ore did not exceed 60 cents per ton with steam power. The fuel bill amounted to 30 cents per ton of ore milled.

Another instance, where we were milling an ore containing 5 per cent lead, 10 per cent zinc and 7 per cent copper and iron, all in sulphides: We crushed, first, with a Blake crusher to about 1 inch diameter, then passed through one set of 14x30-inch Cornish rolls, crushing to 6-mesh fine. All ore that did not pass the first 6-mesh revolving screen came back to the rolls again, then was carried by elevators to the revolving trommels or screens; first 6-mesh screen delivered the screened product to jigs with 4-mesh screens; the next sizing screen was 10-mesh, which delivered its product to jigs with 8-mesh screens; next sizing screen was 16-mesh, which delivered its product to jigs with 12-mesh screens; then all material finer than 16-mesh went to hydraulic sizers, making one class 20-mesh and one class 30-mesh fine, which were sent to separate jigs, and all material finer than 30-mesh was classed as slimes and sent to circular revolving buddles, where the mineral remaining in the pulp was about all taken out, 80 per cent of which would pass 100-mesh assayers' sieve. The tailings were then allowed to run away. In this case the maximum loss was less than $1 per ton, and generally about 50c. The product contained less than 8 per cent silica and less than 8 per cent zinc. We were paid for all the gold, silver and lead in the ore and given free treatment by the smelters. The jigs were ordinary three-compartment Hartz jigs, with slight modifications, running very much faster than the old style of working, and each jig handled about sixteen tons of pulp per twenty-four hours, making all the product through the screens. The buddles or slimers were circular revolving tables, 20 feet diameter, with bed of best Portland cement, revolving once per minute. The pulp and clear water were introduced to the machines somewhat differently from the usual practice. The buddle made a finished and a half-finished, or middling, product. The middlings were discharged into the boot of a small belt and bucket elevator, which raised it up to the feed box and sent it again over the buddle. By this process there was scarcely any loss of slimes and a clean product always obtained. All the concentrators should automatically discharge the finished product into one large tank, divided by a partition in the middle and not over 2½ feet deep, so that water could be drawn off and the product shoveled onto a draining floor while the other one is receiving the product from the machines. Where there is no shortage of clear water a continuous discharge from the jigs may be made by leaving the jig gates partly open; and in cases where there is a shortage of clear water the excess clear water may be raised from the product bin either by elevators or pump and used again in the batteries or rolls, and by putting in a simple device to separate the clear water from the tailings at least 50 per cent of the tail water from the jigs and buddles may be utilized over and over.

The hydraulic sizers were conical-shaped, with point down. All pulp and water passing were compelled to go to the bottom and there separated, where the coarse ore passed out and the overflow going through another hydraulic sizer, the coarse ore passing out at the bottom and the slimes overflowing and going to the slime machines. I would consider no hydraulic sizer a good one that did not have a partition from the top to very near the bottom, thus causing every particle of pulp and water to pass under the partition or cone, causing a complete submersion of all metallic particles. I have seen a valuable product building up like foam on top of an open sizer, which came in contact with the air and would not sink again, consequently flowed off with the surplus and tail waters.

If in either the iron, lead or copper sulphides a complete separation of quartz from the ore did not occur in the ore passing the coarsest screen, I should recommend that the tailings be recrushed to pass through a screen fine enough to insure perfect separation, then sent to the sizers and machines. In some mills it is the practice to regrind all the tailings. No canvas plants are required where ores are treated by the above described processes. Three men per shift will easily handle a fifty-ton plant, viz., one man on the rock breaker, one on the jigs and slimes and one on the motive power and shoveling product from the receiving bins to the draining floor, which should be made of good, tight flooring, with slope of 4 inches in 10 feet towards the receiving bin. The practice of drying the concentrates sent to smelters has been largely abandoned, there being far less loss in handling in bulk or sacks a semi-moist product that if it were thoroughly dried. If the product is desirable, there is very little if any trouble with the smelters about moisture.

Jigs should have one tight and one loose pulley, so that they could be stopped or started instantly without interfering with the other machines, and should have graduated eccentrics to regulate the strike from ⅛ to 1 inch, and should have cast iron discharge gates to regulate the discharge, and may be either double or single jigs. Sizers may be made of iron of any size from 1½ to 8 feet in diameter at the top, or may be made of lumber at the mill. A good carpenter will make one of the smaller sizes in a day.

The best buddles are made of iron entirely, excepting the bottoms of the launder boxes and the cement floor or bed. They are single or double-decked, and each 20-foot buddle will handle with ease twenty tons of pulp per day.

Sulphur Creek, Cal., April 24th, '97.

Strength of Building Stones.

The work being undertaken by the State University of California, under the direction of Professor A. C. Lawson, in examining into the building stones of the State, has created considerable interest in that industry. The following data is given as the crushing strength of American building stone:

From Lee, Mass., come some of the strongest marbles in the world. They will bear a weight of 13,400 pounds to the cubic inch.

The strongest American limestone comes from Kingston, N. Y., and will stand a pressure of 13,900 pounds to the cubic inch.

Tuckahoe marble will bear 12,950 pounds to the cubic inch, and that is more than the red granite of the Bay of Fundy region will stand, its limit being 11,812.

The trap rocks of New Jersey and the dolerites of Staten Island are the strongest stones in the United States, their crushing resistance being 24,000 pounds to the cubic inch.

Rhode Island granite crushes at 17,750 pounds to the cubic inch, that of Virginia will bear 21,250 pounds to the cubic inch, and that from the quarries of Maryland 19,750. The New England granites vary somewhat from these standards, but not greatly.

In Other and Older Lands.

Irrigation in California is a present and pressing problem engaging the attention of trained practical men throughout the commonwealth. All that modern thought and improved mechanical device can do is being used in the correct solution of this important matter. In sharp contrast with this twentieth century method of dealing with this question is the style still in operation in other and older lands, as depicted in the three accompanying illustrations, of irrigation methods and results in some of the famous old lands of the earth.

In the upper view on the next page the Egyptian fellah, who is yoking up his cattle to continue his plowing of land left moist by the receding Nile, is all unconscious that forty centuries are looking down upon him from the summit of the pyramid. The state of his mind is reflected in the rudeness of the character of his tool. Forgetful of yesterday, regardless of to-morrow, he has lost even the ambition of his forefathers, and is content to relieve his stomach from the pangs of hunger and save his back from the throng of the Turkish tax collector, and, accomplishing this, he has little thought beside. Egypt was once the granary of the world, and, even with the rudest appliances, produced a considerable surplus. The old implements and methods prevail, but the old spirit and industry are gone. Only about half of the arable land of the rich Nile valley is now under cultivation. The richest land lies waste. The stimulus to effort is gone. The Turkish yoke has ground the life out of the people. Turkish taxation takes the farmer's product about as fast as he can bring it forth.



CROSS-PLOWING IN AN EGYPTIAN FIELD NEAR CAIRO.

The Egyptian plow shown in the engraving is better than the Asiatic model shown in the larger view on the next page, because it is something of a mold board, which half turns the soil; but it is a very rude affair at best, as can be seen in the smaller view on this page, where a combination ox and camel team is cross-plowing. In the distance are seen the date palms for which Egypt is famous, and they are the chief source of wealth to the country, which, however, goes to the exchequer of the rulers, for the date palm is singled out as a bearer of heavy tax burdens. So heavily are these trees taxed that often the poor fellah, finding that his tree will not bear him a crop large enough to pay the tax, cuts it down, thus ridding himself of the tax evil, as the man got rid of the rats by burning down his barn.

On the dry uplands the camel and dromedary are at home; on low, swampy land the bullock is the recourse of the cultivator. The lower picture on the next page shows a couple of Hindoos discussing the behavior of the off ox, whom no amount of prodding seems to

keep up to his place. The scene is the margin of a river, where the large area of overflowed land offers good field for rice growing. The climate is shown by the semi-tropic vegetation and the decollete costumes of the men. The rudeness of the plow corresponds to the forms already shown in previous pictures of Oriental farming, and the intellectual and social standing of the operators is quite in keeping with the plow. The picture, apart from its picturesqueness, is a sermon on the worth and services of civilization.

These views show forcibly the contrast between the darkness which still prevails in the old lands and the enlightenment of the newer and more progressive nations They show that in countries whose monuments were reared before the dawn of history there is darkness now—the darkness of lost arts and bare survival of primitive industries—which is almost incredible, in view of the progress on other continents of new-found arts and progressive industries. Why has there been this decadence? Why have these lands and peoples either stood still or retrograded through all the centuries of the present era?



AN EGYPTIAN FELLAH AND HIS TEAM PLOWING FOR WHEAT ON LAND MOISTENED BY THE OVERFLOW OF THE NILE.



AN EAST INDIAN PLOWING SCENE—PREPARATION OF RICE GROUND WITH A YOKE OF BLACK WATER OXEN.

Practical Notes on Hydraulic Mining.*

NUMBER VI.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE H. EVANS, C.E., M.E., General Manager Cons. G. Mines of Cal., Ld. Oroville, Cal.

Hydraulic Motors, Water Wheels, Etc.—There is no power easier handled or less complicated than water power, and it would take too much space to give in detail a history of all the various forms of motors, but I will endeavor to describe the particulars and efficiency of the most popular methods.

The power of a fall of water is easily calculated, and is found as follows: Multiply the number of cubic feet per minute by the weight per cubic foot, or 62½ pounds, and the product by the fall in feet, then divide by 33,000. For example: What is the horse-power in a body of water equal to 60 cubic feet per minute, or 40 miners' inches, having a fall of 200 feet? Answer: $\frac{60\times62.5\times200}{33000}=22.72$ H. P., which is the total power in the water, and from this result allowance must be made for friction, etc.

Another easy method of calculating the power is to remember that one cubic foot of water flowing per minute and falling 1 foot is equal to .0016098 horse-power, and that one miners' inch falling 1 foot is equal to .0024147 horse-power. These multipliers will give result equal to about 85 per cent of the theoretical power.

Example 1. What horse-power can be obtained from 40 cubic feet of water per minute falling 300 feet, using a motor giving about 85 per cent efficiency? Answer: $.0016098\times40\times300=19.31$ H. P.

Example 2. What horse-power can be obtained from 100 miners' inches of water falling 60 feet, using a motor giving about 85 per cent efficiency? Answer: $.0024147\times100\times60=14.48$ H. P.

The most common forms of wheels used by many miners are current or bull wheels, undershot wheels, breast wheels and overshot wheels. The efficiency of these various wheels vary about as follows: Current or bull wheels, 20 to 50 per cent; undershot wheels, 27 to 35 per cent; breast wheels, 45 to 60 per cent; overshot wheels, 60 to 75 per cent. The next class of motors includes the various forms of turbines, of which there are numerous varieties, many of them giving as high as 85 to 87 per cent.

Approximate and simple rules for finding quantity of water, height of fall and horse-power developed at an efficiency of 75 per cent are as follows:

Quantity of water in cubic feet per minute is found by multiplying the horse-power by 706 and dividing the product by the fall in feet. Example: How much water is required with 200 feet of a fall to develop 10 horse-power, using a motor giving 75 per cent efficiency? Answer: $10\times706\div200=35.3$ cubic feet per minute, or about 24 miners' inches.

To find how much fall is required to generate a required horse-power, with a known quantity of water, multiply the horse-power by 706 and divide by the quantity of cubic feet per minute.

Example: Having a supply of 60 cubic feet per minute, and requiring 20 horse-power from motor giving 75 per cent efficiency, what fall is necessary? Answer: $20\times706\div60=235.3$ feet.

To find the horse-power in a fall of water when the fall and quantity are known, multiply the number of cubic feet per minute by the height of fall and divide by 706.

Example: Having a fall of 100 cubic feet per minute, and a fall of 75 feet, what horse-power can be obtained from a motor giving 75 per cent efficiency? Answer: $100\times75\div706=10.6$ H. P.

Should the motor be of a class that would give only 65 per cent efficiency, such as most overshot wheels, it is necessary to use 815 as a multiplier instead of 706.

Current or Bull Wheels.—To calculate the horse power of a current or bull wheel, it should be understood that in all such motors the velocity of the periphery of the wheel, or, more plainly speaking, the number of feet per second the rim of the wheel is traveling, should never vary much from half the velocity of the stream, or half the velocity due to the head of water. In this class of wheels the diameter is seldom less than 6 feet, or greater than 16 feet, and the number of floats 7 to 13. The inclination of floats from radial lines should be between 20 and 30 degrees, depth of floats from 10 to 16 inches, and they should be immersed for about one-half their depth.

The horse power of this class of motors is found by the following formula:

$H=.0028\times V\times M\times A\times(V-M)$.

$M=V\times.55$.

x=cosine of angle between the floats, multiplied by the radius minus the radius, or the distance below a horizontal line produced from under the extremity of the vertical float.

Where H=horse power.

V=velocity of current in feet per second.

M=the mean velocity of the periphery of the wheel in feet per second.

A=the immersed area of the floats in square feet

To obtain the angle between the floats, divide 360 (the number of degrees in a circle) by the number of floats on the wheel.

Example: A current or bull wheel, 16 feet in diameter, having 12 floats, each of which are 8 feet long, with a maximum immersion of 15 inches, what is the horse power of the wheel, when the stream has a velocity of 7 feet per second?

Answer: Angle between floats $=360\div12$ or 30 degrees. x = the cosine of the angle of 30 degrees, or .86603 × by the radius or 8 feet = 6.92824 — the radius, 8 feet = 1.0717 or 12.86 inches. This is the distance that the second float will be above the horizontal line produced from under the extreme edge of the vertical float, thus showing that although the maximum immersion of any of the floats is 15 inches, the adjoining floats would be 12.86 inches higher, and to get at the area of the immersed floats, the depth of the second float will be $15-12.86=2.14$ inches, and and the area of the three immersed floats $=15+2.14+2.14$ inches, or 1.606 feet multiplied by length of floats, or 8 feet=12.84 feet area, and the velocity being 7 feet per second, M or the mean velocity of the periphery of the wheel $=7\times.55$ or 3.85 feet per second.

V M A V M

Now, $H=.0028\times8\times3.85\times12.84\times(7-3.85)=3.49$ H. P.

Undershot Wheels.—To determine the horse power of an undershot wheel, with a rim velocity equal to about one-half, or .57 times the velocity due to the head of water, or $.57\times\sqrt{2gh}$. Where g is the acceleration of gravity, commonly taken as 32.2, and h is the head of water in feet above the bottom of the wheel, $H=.00066\ Q\ h$ or $\frac{W\times h}{30000}\times0.35$.

$$Q=\frac{1511\times H}{h}.$$

Where h = head of water.

Q = quantity of water in cubic feet per minute.

W = weight of water in pounds.

H = effective horse-power.

Example: What horse-power is obtainable from an undershot wheel, with about 35 per cent efficiency, using 1500 cubic feet per minute, with a head of 2 feet? Answer: $H=.00066\times1500\times2=1.98$ H. P., or $Q=\frac{1511\times1.98}{2}=1496$ cubic feet per minute.

Breast Wheels.—The following calculations will explain how to arrive at the effective horse-power of breast wheels:

Low breast wheels: $H=.00104Q\times h$. $Q=\frac{961\times H}{h}$

or, $H=\frac{W\times h}{33000}\times0.55$.

High breast wheels: $H=.00108Q\times h$. $Q=\frac{928\times H}{h}$

or, $H=\frac{W\times h}{33000}\times0.60$.

Where Q=quantity of water in cubic feet per minute.

h=head of water in feet.

H=effective horse-power.

W=weight of water in pounds.

Example 1. A breast wheel 16 feet in diameter, using 1500 cubic feet of water per minute, under an 8-foot head, what will be the horse-power of the wheel? Answer: $H=.00104\times1500\times8=12.48$ H.P.

Q h

Example 2. How much water will be required under a 10-foot head to generate 25 horse-power, with a breast wheel 21 feet in diameter? Answer: $Q=\frac{961\times H}{h}=\frac{961\times21}{10}=2018$ cubic feet per minute.

In either of the above cases if the wheel takes the water above one-half its diameter, of course the power would be increased, and calculations should be made by using the formulæ given for high breast wheels. For example: A wheel 22 feet in diameter, using 500 cubic feet of water per minute, under a head of 16 feet (that is to say, the water goes into the buckets at a point 16 feet from the bottom of the wheel), what horse-power will the wheel give? Answer: $H=.00108\times500\times16=8.64$ H. P.; and

$$Q=\frac{928\times8\ 64}{16}=500$$ cubic feet per minute.

(To be Continued.)

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Africa's Steady Yield.

In spite of the fact that London speculators have run down the price of shares in African gold mines, the industry managed by the engineers probably without much regard to the price of shares, shows a healthy growth. The following table shows the output each month since January, 1892:

Month.	*1892.* Ozs. dwt.	*1893.* Ozs.	*1894.* Ozs.	*1895.* Ozs.	*1896.* Ozs.	*1897.* Ozs.
January....	84,560 8	108,374	149,814	177,463	148,178	209,832
February..	86,649 8	93,252	151,870	169,295	167,018	211,000
March.....	93,344 11	110,474	165,372	184,945	178,982	233,066
April.....	95,562 6	122,053	168,745	186,323	176,707	.....
May.....	99,436 6	116,911	169,773	194,581	195,008	.....
June.....	103,252 3	122,907	168,162	200,941	198,640	.....
July.....	110,279 1	126,169	167,953	199,453	203,873	.....
August.....	102,322 3	136,069	174,977	203,573	213,418	.....
September.	107,851 13	129,585	176,707	194,764	202,562	.....
October....	112,167 8	138,599	173,378	192,652	199,890	.....
November.	106,794 15	138,640	173,304	195,213	201,118	.....
December..	170,748 17	148,357	182,104	178,428	206,518	.....
Totals....1,120,863 1		1,478,473	2,024,159	2,277,635	2,381,875	652,898

Blank Forms for Quartz Location Notices.

Recent inquiry for a satisfactory blank for a quartz location notice, to conform with the new mining location law, results in our proffering the following, which have been gone over by a prominent practical miner, an experienced mining engineer and a leading mining lawyer:

FIRST OR PRELIMINARY NOTICE OF DISCOVERY AND LOCATION OF ..... QUARTZ LODE MINING CLAIM.

..... Quartz Lode Mining Claim,
..... Mining District,
..... County,

State of California.

The undersigned, who ..... citizen.. of the United States, or ha.... declared ..... intention to become such citizen.. and ..... of lawful age, hereby declare and give notice to all persons concerned that ..... ha..... discovered, within the limits of the claim hereby located, a vein or lode of quartz or other rock in place bearing ..... and other precious metals. That the course of said vein or lode, as near as can be ascertained from present development, is northwesterly and southeasterly. That ..... ha.... this ..... day of ..... A. D. 189.., discovered and located, and do.... hereby locate and claim, under and by virtue of the provisions of Chapter Six of Title XXXII of the Revised Statutes of the United States, and acts amendatory thereto, and the laws of the State of California, a mining claim upon said vein or lode to be named the ..... quartz lode mining claim, extending from the point of discovery (where this notice is posted on a substantial monument) along said vein or lode ..... feet in a ..... direction to a ....., and ..... feet in a ..... direction to a ..... and ..... feet on either side of the middle or center of said vein or lode at the surface, comprising in all ..... feet in length along said vein or lode and ..... feet in width, with all the rights and privileges as to surface ground and veins, lodes or ledges within the boundaries of said claim and otherwise, and the metals, minerals and valuable deposits of every kind contained in said veins, lodes or ledges, or within said boundaries, which are given or allowed by the provisions of the laws of the United States aforesaid or by the laws of the State of California.

The said mining claim hereby located is situate in the ....., mining district, County of ....., State of California, and is situated .....

.....

.....

.....

The adjoining claims, so far as known, are the ..... claim on the ...., the ..... claim on the ..... and the ..... claim on the ..... And ..... hereby further declare and give notice:

1. That the name of the lode or claim hereby located is the ..... quartz lode mining claim.
2. That the name.. of the locator.. .....
3. That the date of the discovery is .... A. D. 189..
4. That the length of the vein is .....
5. That the width of the vein is .....
6. That the general course of the vein is .....
7. That this is the first or preliminary notice.

The undersigned intend.. to hold this cl im under and in accordance with the provisions of the laws of the United States and of the State of California, and to record this notice in the office of the Recorder of said County within twenty days from the date hereof, as provided by law.

Dated ....., 189... and signed:

.....
.....

Locator.. and Claimant..

CERTIFICATE OF LOCATION.

FINAL OR COMPLETED NOTICE OF LOCATION OF A QUARTZ LODE MINING CLAIM.

.....Quartz Lode Mining Claim,
.....Mining District,
.....County,

State of California.

The undersigned, who ..... citizen.. of the United States (or ha.... declared ..... intention to become such citizen..) and ..... of lawful age, hereby declare.. and give.. notice to all persons concerned that ..... ha.... discovered within the limits of the claim hereby located a vein or lode of quartz or other rock in place, bearing ..... and that on the ..... day of ..... A. D. 189.., ... did locate and claim, under and by virtue of Chapter Six, Title XXXII of the Revised Statutes of the United States and the laws amendatory thereto and the laws of the State of California, a mining claim upon said vein or lode to be named the ..... Quartz Lode Mining Claim.

That thereupon ..... erected at the point of discovery a substantial monument or mound of rocks and posted thereon a preliminary notice containing the name of the lode or claim, the name of the locator or locators, the date of discovery, the length, width and general course of the vein, and a statement that said notice was a first or preliminary notice, and within twenty days from the date of such discovery did record a copy of said preliminary notice in the office of the county recorder of ..... county.

And the undersigned locator.. do.... hereby certify:

1. That the name of the lode or claim is the..... Quartz Lode Mining Claim.
2. That the name.. of the locator.. .....
3. That the date of discovery and posting of notice was the..... day of ....., A. D. 189..
4. That the claim so located extends along said vein or lode..... ..... feet in a ..... direction and ..... feet in a ..... direction from the point of discovery where said preliminary notice was posted, and is ..... feet in length along said lode or vein and ..... feet in width, being ..... feet on each side of the middle of the vein at the surface.

That said claim is distinctly marked upon the ground so that its boundaries can be readily traced by a substantial monument or mound of stone at the point of discovery, and by ..... at each end of the claim upon the lode or vein, and at each corner of the claim, the exterior boundaries of the claim as marked by said monuments being as follows, to-wit:

Beginning at.....

.....

.....

.....

.....

.....

.....

.....

.....

That this claim is in the ..... mining district, county of ..... State of California, and is situated

.....

.....

.....

5. That this certificate is the final or completed notice of location of said ..... claim, and that the locator.. of said claim ha.... since the date of the discovery and location thereof done and performed or caused to be done and performed labor to the value of at least fifty dollars ($50).

That the nature of such labor was.....

.....

and that the reasonable value of said labor was ..... dollars ($.....).

Dated ...., A. D. 189.., and signed

.....
.....

Locator.. and Claimant..

STATE OF CALIFORNIA, } ss.
COUNTY OF..... }

..... being first duly sworn, says that he is of lawful age and .....

..... a citizen of the United States and is ..... locator.. and claimant.. of the quartz lode mining claim mentioned and described in the foregoing certificate of location and ..... person.. whose name.. ..... subscribed thereto as such locator.. and claimant.. That he knows the contents of said certificate and that the matters and things therein stated are true.

Subscribed and sworn to before me this ..... day of ....., 189..

[SEAL] .....

In and for the county of ....., State of California.

The above forms have been prepared with intelligent care, adapting to the requirements of the new State law, the

standard Montana form, which has been in use fifteen years, has passed the Washington departments in over four thousand patent cases and has been through the United States Supreme Court several times. In the form for the first notice it will be noticed that the passage customary in this State is omitted, which claims water and timber "as given by law," for the reason that neither of these is now given or ever was given by either the national or State mining law. Our codes already provide the only way in which water rights may be acquired, and the act of June 3rd, 1878, provides for timber grown on public mineral land. No additional rights to wood and water can be acquired by posting the quartz location notice, and any attempt to do so is useless.

The first lines in the body of the notice recite the compliance of the locator with the statutory conditions, which will enable him to locate a quartz claim at all. He must be a citizen and he must discover mineral. It is especially necessary that he thus qualify himself. The new State law makes the location notice prima facie evidence of the facts therein recited. In the preliminary notice under the State law, the filling of all the blanks would not be entirely necessary, but the new law requires that this notice be recorded; and Section 2324, Revised Statutes U. S., says: "All records of mining claims hereafter made shall contain the name or names of the locators, the date of the location, and such a description of the claim located by reference to some natural object or permanent monument as will identify the claim." Another part of the same section prohibits the enacting of any location laws limiting or omitting these provisions. The term "adjoining claim" is of value, definitely showing what the locator intended to take up, and a recent court decision seems to almost require it.

The above is not submitted as being perfect, but in response to a general demand it is published in a hope that it will prove generally satisfactory.

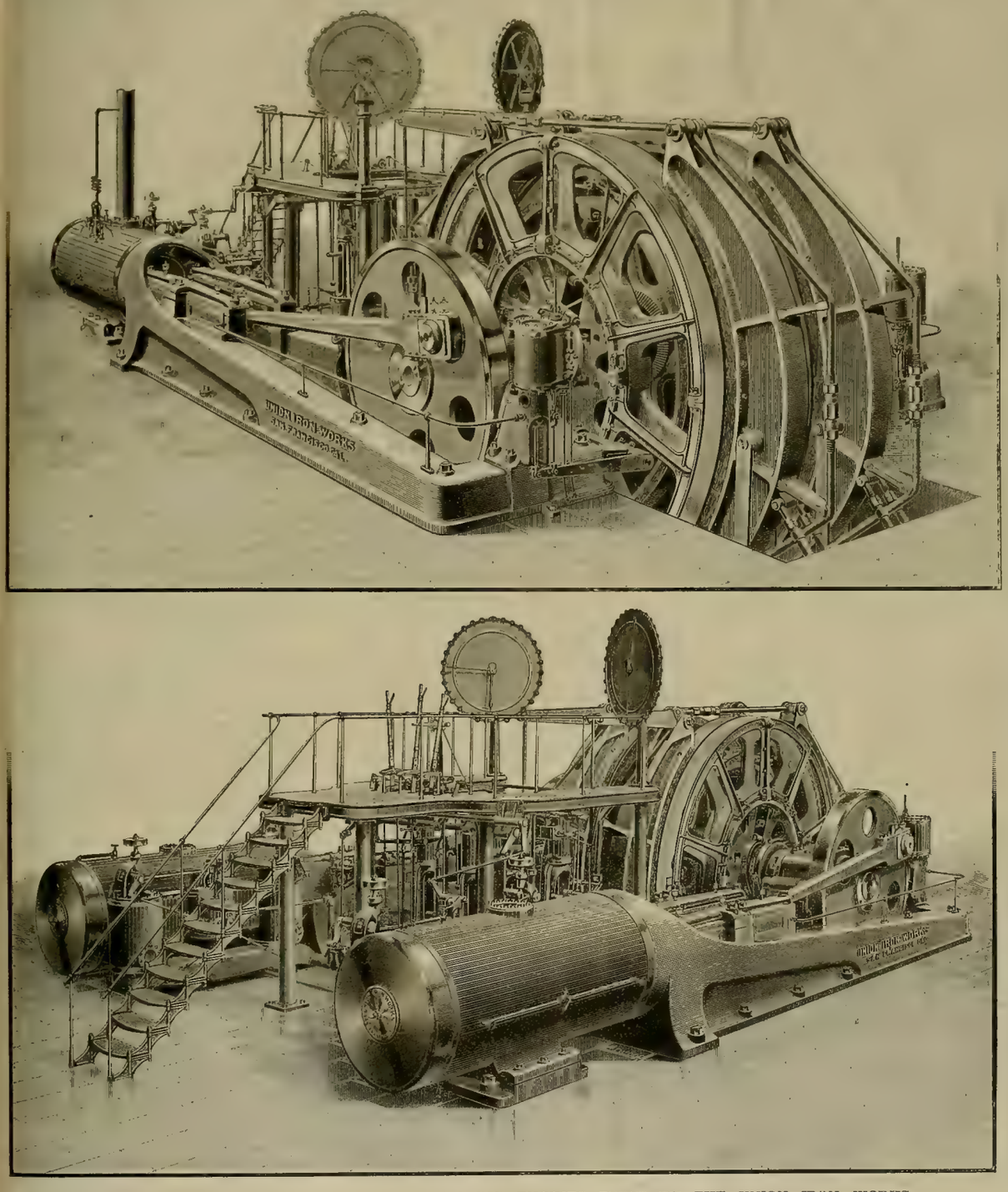
SEVERAL BLOCKS of the streets of Glasgow, Scotland, are to be paved with California asphalt for the purpose of giving a thorough trial. Glasgow manages its municipal affairs better than most cities.

Direct Acting Hoisting Engines.

Herewith is illustrated a pair of 30 in. x 72 in. direct acting hoisting engines, lately built by the Union Iron Works of this city for the Anaconda Copper Mining Company of Montana. These engines are intended to embody all the very latest improvements that experience and practical working have demonstrated as valuable in this class of machinery. The brakes, clutches and reversing gear are arranged to be operated by compressed air or steam, by means of auxiliary cylinders which are under full control of the engineer, stationed upon the elevated platform shown, insuring the most rapid work with absolute safety.

The center bearing usually employed has been dispensed with in these engines. The shaft is hollow forged steel and of ample strength and stiffness to withstand any strains that can be brought to bear upon it. All reciprocating parts are of steel and are as light as consistent with the duty required. The strains due to contraction and expansion have been eliminated in these engines, as the cylinders are of the "overhung" type, their weight being taken by a guide saddle, which admits of free longitudinal movement, due to expansion, causing no strain on bed plate or foundations. The cylinders are steam-jacketed and fitted with valves of the Scott & O'Neil balanced type, provided with Corliss releasing gear and hand cut-off, enabling the engines to be run economically with reference to the work to be performed. The bed plates are a modification of the Porter Allen type, heavy and substantial, with large foundation base and anchor bolts.

These engines, before being shipped, were tested at the Works, and from their action and the ease with which they were handled it is confidently expected that this type of engine will be adopted by the company for all their deep working. A duplicate of this engine has also been furnished the Homestake Mining Company of Dakota.



PAIR OF 30. IN. X 72 IN. DIRECT ACTING HOISTING ENGINES BUILT BY THE UNION IRON WORKS.

Rapid Tunneling.

In response to a request from the MINING AND SCIENTIFIC PRESS, Mr. Robinson of the Hexter mine at Mokelumne Hill has furnished the following interesting data as to the driving of their tunnel:

I have run the Hexter tunnel very rapidly, considering the hardness of the rock the tunnel passed through. It was a very hard syenite rock, often requiring twenty-four hours to drill one round of holes in the face of the tunnel, which, when fired, broke an 8x8 opening. This I timbered with 10x10 Oregon pine timber, leaving a tunnel 7 ft. x 6 ft. 4 in. x 5 ft. I use a compressor, driven by water power, 400 feet head. My average speed has been 40 feet per week, completing the drainway and boarding it, thus preventing the waste water from flowing over the track. It was my practice to pay the workmen a bonus of $11 per running foot for all over 40 feet they drove per week, but only one month did they earn a bonus. That month they made 195 feet. In the aggregate they did good work. The machine men were never allowed to hammer their drill, as is the habit of mining when it sticks. Thus I was enabled to keep my machines in first-class condition, never requiring to send them to the shop for repairs. My plan is to spring the holes before charging. Fire the relief and bottom holes first, reserving for the last the roof holes. In this way a square, clean break is effected and the roof is not shattered, and all danger of dropping stones is obviated in a great measure.

Some mining man has said that a tunnel or shaft can be sunk through hard rock as cheaply but not so rapidly by means of hand drills as by machine drills. It is not so. For instance, with me the ditch broke and for one day I was compelled to resort to hand drills, and not to exceed 8 inches of tunnel was made that day.

What I have performed in a few months in this hard rock with machine drills would have taken as many years to have accomplished with hand drills.

W. T. ROBINSON, Supt. Hexter M. Co.
Mokelumne Hill, April 26th, '97.

ACCORDING to the recently published report of the Russian Department of Mines for 1895, the production of platinum for that year was 9700 pounds, a decrease of 1700 pounds from that of the year preceding. The production of all other mineral products showed a decided increase, except that of gold, which decreased slightly. The largest relative increase was in mercury, the production of which, 500 tons, was more than twice that of the previous year.

THE laboratory at Cornell University has many "rare earths." A recent inventory disclosed that of didymium, which sells for $7 an ounce, Cornell has 300 ounces; of cerium, quoted at $6 an ounce, 400 ounces; of lanthanum, worth $35 an ounce, 30 ounces.

Mechanical Progress.

The Use of Compressed Air for Mining Purposes.

A lecture delivered to the Engineering Students of the Leland Stanford Jr. University, May 3, 1897, by EDWARD A. RIX, M. Am. Soc. M. E.

It was my intention when first invited to read a paper here on Compressed Air, to deal with the subject of "Power Transmission by Compressed Air," inasmuch as that particular theme is just now the subject of much speculation among engineers, and of much interest to power consumers, but upon reflection it appeared to me to be a better plan, and one which would help you the most, to discuss that use of compressed air which at present most vitally affects our own interests, namely, its use in our mines.

All of you, as engineers or spectators, in travelling through the mining counties of this State, will have occasion to observe the use and abuse of compressed air in many of its more important applications, and you will feel much more at home with the subject on such occasions after listening to a paper directed to that particular end than if a general subject, such as "Transmission," was dilated upon with no particular plant in this State to offer as an object lesson.

It is not my purpose to belittle the service which is rendered by that incomparable, mysterious power which we call electricity, although I may claim that it has usurped the legitimate place of compressed air in many instances. There is no conflict between these two great agencies. Each has its proper and legitimate field of usefulness, independent of the other, and it is easy for an intelligent engineer to recognize these separate rights, and in proportion as he does, so will his work be successful. A small portion of the territory of these powers seems to overlap and it is there that we hear the noise and confusion of disputed title, and many in the midst of this turmoil lose sight of the great independent domain of each which required development and which will yield rich return to the earnest student and worker.

Compressed air is the only power which is alone sufficient to supply all the power needs of an average mine. For lighting purposes from five to ten per cent may, if required, be converted into electricity for that purpose. Where steam or water power is used, fifty per cent or more is converted into compressed air, and five to ten per cent into electricity for lighting. Where electricity is used, from fifty per cent to ninety per cent is converted into compressed air, the remainder being directly used for lighting.

The reason for so great a conversion of other powers into compressed air lies in the fact that generally one-half the entire power is absorbed by pumps, underground hoists and rock drills. The two former, in nineteen cases out of twenty, are actuated by compressed air, and the latter always. It is true that both the hoists and pumps may be run by electricity economically, but as yet there has not been produced a rock drill actuated by electricity, which has been a success, and inasmuch as air is required for rock drills, and as they consume more than the pumps and hoist as a rule, the mine management generally concludes to use air for all three kinds of work rather than introduce two kinds of power service underground.

I am perfectly aware that my statement regarding the failure of electric rock drills may be disputed by manufacturers of the so-called article, or by electrical enthusiasts, but notwithstanding all that, shall maintain my statement true, and it will receive the support of the larger electrical concerns.

It is true that electric drills have been made by two or three firms and on the shop floor they drill very nicely, at the rate of 2 inches per minute, in medium granite, for the first 2 feet. From that point on to 4½ feet, the average depth of a blasting hole, their drilling capacity deteriorates very rapidly.

The air drill does from three to four times the work easily.

The claim for the electric drill is that it consumes but one-third the power. This is true, but if it takes three of them to do the work of one air drill, the wages of six men will have to be balanced against the wages of two men and the extra power consumption. The latter equals perhaps the pay of one man, so that to do the same work with the electric drill would cost twice more than for the air drill.

There are other considerations, however, independent of this, which militate against the electric drill, viz., that it will not stand the dust, mud, water, hammer beating and general rough usage, and again, it would be necessary to introduce a ventilating system for fresh air, as well as to expel smoke, where electric drills are used, while with the air machines their exhaust furnishes all necessary fresh air and ventilation.

It needs no great discernment to see, therefore, that the simplest and most desirable proposition, and the one involving the least machinery and transformation of one power into the other, is compressed air, which exchanges from five to ten per cent of itself for lighting purposes only, while any of the others must make exchange for at least fifty per cent of air and the lighting beside.

I have assumed, of course, that the cost of any of these powers delivered to the mine was equal, and the motors which absorbed them were the most efficient for the purpose.

All things being equal, then, I assume from what I have seen of the various requirements of a mine for power purposes, and for the reasons given before, that compressed air is the ideal power for general mining purposes. With varying conditions, however, it is simply a matter of combining and comparing the cost of fuel or water, repairs, interest on the plant, insurance and taxes, in order to select the proper general power, and should comparisons be nearly equal, then general utility, simplicity and safety should decide the choice.

When the preponderance of evidence is for any one of these forms or power it requires no skill to make a selection, but when all things are equal as to cost and maintenance, or nearly so, in bringing any of the powers to the mine, then I wish to show why compressed air should be the choice without hesitation, and after the choice is thus made, how to use it so as to justify the choice.

Compressed air has been abused in its use most shamefully, and until recently none of its friends has been able to be seen or heard, so intensely has the interest of the world been centered upon the marvelous results of the investigation in the electrical phenomena. The mysterious has such a fascination for the ordinary mind, and the meteoric developments of electrical science have followed so thick and fast and in so many fields of usefulness, that the average individual could be stampeded into the electrical camp by a mere mention of the name of this most elusive fluid. Now there has come a breathing spell, and the advocates of compressed air are calling attention to the fact that compressed air, properly generated and applied, owns a place in the economies of the day, and this they propose to maintain.

Compressed air has been generally understood to be a most expensive form of power, and has been given sufferance only because of its utility, since for underground work it really has no rival at any price. Because the laws of compression and expansion of permanent gases belong to the realm of higher mathematics few understood what they were dealing with, and many of these, unable to overcome the freezing of their motors, did as the public generally did, viz., used the air at practically full stroke and threw away all the intrinsic energy of the air which we can develop by expansion. Theoretically, they thus threw away two-thirds of their power, and practically about three-fourths. Ordinary direct acting pumps and rock drills do not even have an efficiency of 25%. No small wonder, then, that the wood piles have dwindled rapidly away and small power results been produced. Everything was sacrificed to utility, and compressed air did not take its proper rank until engineers began to realize that it must be used expansively. To use air in an ordinary direct acting pump is equivalent to throttling a head of water to one-fourth of its spouting velocity to accommodate the speed of a wrongly geared water wheel.

I fancy that most of the trouble on the whole subject has arisen from a misconception of what compressed air is in a power sense.

Many believe that the power of the engine which compresses the air has been stored in the compressed air, and the more steam they give the engine, and the harder it worries and flurries, the more work the air should finally yield up. They cannot understand that a pound of compressed air at the same temperature contains the same intrinsic energy, no matter what the pressure is, and this is originally contained in the atmosphere before it is compressed at all. This being the case, no matter what power was expended to compress 1 pound of air to say 90 lbs. gauge pressure, it will have at the same temperature but one intrinsic potential stored within it. Temperature is the head—if I may use a term applied to water; from it comes the power. If by reason of a physical condition—viz., pressure—1 pound of air is allowed to fall from a height represented by a temperature 60 to one lower, represented by say —60, that 1 pound will generate 184.93 foot pounds of work, through every degree it falls, and so on until it reaches —461, the absolute 0, which is the bottom where in theory air has neither pressure nor volume, and its work is done. The total intrinsic energy is always 184.93 multiplied by the number of degrees the 1 lb. of air is distant from —461 degrees Fahr.

This 184.93 is simply the 778 which represents the foot pounds of work in one British thermal unit, multiplied by 0.2377, which is the specific heat of air at constant volume; that is to say, it is the fraction of a B. T. U. necessary to raise 1 pound of air 1 degree. The quantity of heat, therefore, necessary to raise the temperature of 1 pound of air from absolute zero to 60 degrees Fahr., which represents a distance of 521 degrees, will be 184.93 multiplied by 521, which would be 96,348.52 foot pounds, which represents the intrinsic energy of 1 pound of air at 60 degrees Fahr. This, of course, presumes that no heat will be either lost or gained by radiation or otherwise during the expansion of air, and this sort of expansion is called adiabatic.

The center of the earth is the absolute 0 of water-power, for there water has no weight. This corresponds to the absolute 0 of air, and every pound of water at the same distance, measured in pressure, from the center of the earth, has the same potential, and independent of its temperature, just as 1 pound of air has the same potential at the same distance, measured in temperature, from its absolute 0, independent of its pressure.

The sea level for water corresponds to the atmospheric line for air, for at these points neither will manifest motion or power. Suppose the land and water to be on a level, we could not then use any of the potential in the water, unless by some mechanical device we continually created a shaft, whose depth we would call pressure, below the sea level for the water to fall into and generate power, and it matters not how much power it requires to maintain this shaft at any depth, 1 lb. of water dropping into it will always yield up the same fraction of its total intrinsic potential. The same with air; at the atmospheric line we cannot avail ourselves of its potential, so we use a mechanical device called a compressor to prepare a shaft, as it were, which we also call pressure, whose depth we measure in degrees of temperature, and no matter how much power it takes to maintain this condition of affairs, 1 lb. of air dropping into this shaft will always give out the same fraction of its total intrinsic energy. I hope I have made the idea clear that I wished to convey, viz., that in neither case did the resultant power depend for its measure upon the mechanical means which caused its activity. Consequently, in compressing air the energy stored in the compressed air is not a definite function of the power required to compress it, but is a definite function of an ideal compression we call isothermal, with an empirical index determined by practice.

In order to show you by some calculations that the intrinsic energy in the air is independent of its pressure and that no matter between what points of pressure you expand the air, there will always be enough power in the air left to account for its total intrinsic energy, viz., 96,348.52 foot lbs. at 60 degrees Fahr. This will show you at the same time why we depend upon the pressure to put the air in a condition to realize a portion of its intrinsic energy for work.

Taking, for instance, 1. lb. of air at 100 lbs. gauge, and at 60 degrees Fahr., if allowed to expand adiabatically to atmospheric pressure, it will produce work, and consequently lose part of its heat, and we find that its temperature, after expansion has taken place, is:

$$173.96 \text{ degrees Fahr.} \quad \frac{T}{To} = \frac{(P)}{(Po)}^{\frac{Y-1}{Y}}$$

The drop of temperature is:

$$173.95+60=233.95 \text{ degrees;}$$

and as $778\times0.2377=184.93$, the work of adiabatic expansion is:

$$184.93\times233.95=43,264.37 \text{ ft. lbs.,}$$

this being the *useful work.*

The adiabatic work of expansion from 173 95 degs. Fahr. to the absolute 0 would be $184\ 93\times287.05=53,084\ 15$ ft. lbs.

Total 96,348.52 ft. lbs.,

which is the total intrinsic energy; that is to say, we have utilized 45 per cent of the total intrinsic energy.

Next, taking air at 10 lbs. gauge, the temperature after adiabatic expansion to atmospheric pressure is 12.9 degrees Fahr., and the useful work of expansion is:

$$184.93\times72.9=13,481\ 39 \text{ ft. lbs.}$$

The adiabatic expansion from —12 9 degs. to absolute 0 would give:

$$184\ 93\times448.1=82,867.13 \text{ ft. lbs.}$$

Total 96,348.52 ft. lbs.,

i. e., the total intrinsic energy, and the useful work is here 14 per cent of the total intrinsic energy.

It is hardly necessary to say that these figures are theoretical, because, in practice, part of the work of expansion, and consequently part of the heat, is absorbed by the friction of the piston in the cylinder, and lost by radiation from the various pieces of the machines.

We see, therefore, that the only portion of the intrinsic energy of air that is practically obtainable is the expansion work which it does above atmospheric pressure, *i. e.*, that the pressure of this air must be raised above the pressure of the atmosphere.

(To be Continued.)

A NOVELTY in the way of row boats is being made by a company in New York City. The boats are made of waterproof canvas and rubber, in four distinct air-tight compartments. While said to be not easily punctured, if that should happen the manufacturers say a boat full of water will sustain in safety all who can get in it. They are regularly made in four sizes, 7 ft. to 16 ft.; they have wood or air cushion seats as desired, with metal row locks and wood base, buckled into an upper air chamber. It is said that two or three of these boats of ordinary size can be carried in an average traveling trunk.

Scientific Progress.

Photography in Natural Colors.

Frank H. Mason, United States Consul at Frankfort, Germany, thus describes Chassagne's discovery: But it remained for a French savant, M. Villedieu Chassagne, of No. 40 Avenue des Ternes, Paris, working out a theory suggested by Dr. Adrien Dansac, to find the real philosopher's stone, and to produce, by purely chemical means, on sensitized plates, paper, or films, photographs showing the actual colors of the subject as they appear in nature. The process of M. Chassagne, to which he has devoted many years of study and costly experiment, is exceedingly direct and simple in its practical application, and may be briefly described as follows:

An ordinary sensitized gelatin plate is first treated by immersion in a colorless solution of certain salts, the secret of which the inventor has not yet revealed. This plate, being exposed in a camera, receives a negative impression, and is developed, fixed, and finished in the ordinary manner, producing a monochromatic negative precisely similar in appearance to any other. That is to say, the treatment of the dry plate by the mysterious liquid of M. Chassagne reveals no visible effect in the appearance of the negative which is produced therefrom.

From this negative there is then printed, by the usual process of contact and exposure to light, a positive, which may be made on sensitized paper, or film, or glass gelatin plate, which has been likewise treated before printing with the same colorless and unexplained solution. Thus far, all is monochromatic, and does not differ in appearance from any ordinary negative and the paper print or transparent positive made therefrom. The miracle now appears in the fact that the treatment of the negative plate and positive print with the limpid solution has imparted to the latter the occult instinct of selective absorption; in other words, the power to absorb and assimilate from solutions of the primary colors the exact quantity and proportion of each tint that is required to produce all the hues and gradations of nature.

The positive is now passed successively through three colored solutions—blue, red, and green—and from these it takes up by absorption the proportionate amount of each color that is required to give the colors and gradations of tint which were present in the natural subject of the photograph. If this photograph is a portrait, the flesh tints become warm and vital, the colors of the eyes, hair, and every detail of hue and texture in the costume, jewelry, etc., are faithfully reproduced. If the subject is a landscape, the sky becomes blue or gray as in nature, the grass and all the elaborate gamut of green, brown, and purple shadows, which occur, for instance, in a wood or group of trees of different species under strong sunlight, are brought out with marvelous fidelity. Such a positive, printed on glass as a transparency, hung in a window and studied from behind with a strong monocle, produces the effect of looking upon the actual landscape. Paintings, either in oil or water colors, are reproduced so literally as to fairly deceive the eye, in all except size, the photograph copies being, of course, generally much smaller than the originals.

From this brief description it will be obvious that the discovery of M. Chassagne is embodied in the chemical composition of the four liquids, one of which is colorless, one blue, one green, and the other red. The process of using these liquids, which is so simple as to be within the easy reach of any professional or good amateur photographer, has been patented in all civilized countries where patents are granted, but the composition of the liquids is thus far a secret, and is not described in the applications.

In view of the importance of testing a water-supply, especially for nitrites that may indicate contamination, the following is noteworthy. Zambelli recommends the colorimetric method for determining nitrites. A reagent is made by dissolving 2 grammes of sulphanilic acid and 2 grammes of phenol in 50 cc. of equal parts of sulphuric acid and water. A measured quantity of the solution to be tested is placed in a flask, and 2 or 3 cc. of the above solution added. In ten to fifteen minutes the solution is made just alkaline with ammonia; if nitrous acid be present a yellow coloration will be produced. This color is matched by repeating the reaction, using a standard solution of silver nitrite.

Fluid Air for Industrial Uses.

Charles deKay, United States Consul-General at Berlin, writes of the new method invented by Linde for producing fluid air cheaply.

Hitherto the classic example of a method to liquefy air and obtain oxygen has been that invented by Beatty and Cailletet in 1877. With their machine, one began with carbonic acid gas. By means of a pump, this gas was condensed in a tube, round which lay water at 10° to keep the tube cool. The carbonic acid gas, being reduced to a very low temperature, passed from the first tube into another chamber with a tube in it, and in so doing fell to a lower temperature. Into this second tube was pumped at high pressure ethylene gas, which, in turn, fell to a low temperature, owing to the coldness of the carbonic acid gas bathing the tube. The ethylene gas was then passed from the second tube into a third compartment and fell further in temperature in so doing. The third compartment had likewise a tube with an air pump attached. Into this third tube was pumped oxygen gas and from the ethylene gas bathing it the oxygen gas reached a temperature of 192° below zero. Finally, the oxygen was let out into a fourth compartment, in which was a fourth tube. The air pump attached to this fourth tube having filled it with condensed atmospheric air, the latter was so reduced in temperature that, when it in turn was released from the tube, its cold was 273° below zero, and it appeared in the form of drops like water.

This product, which is called liquid or fluid air, has a milky appearance from the presence of some carbonic-acid gas, bubbles constantly, and from its enormous cold emits a smoke or cloud like the top of a very high mountain, and will only gradually resolve itself again into air when exposed to the ordinary atmosphere.

Fluid air costs about 10 marks (say $2.25) for 5 cubic meters reduced. The new method is the invention of Professor Linde, of Munich. It produces the liquid for 10 pfennigs (say 2½ cents) for 5 cubic meters, and it yields the product either as a gas or fluid, as one wishes. This is one of the most ingenious pieces of mechanism recently known; its chief feature is its economy of working, for it uses air to refrigerate air. After the pump has worked for a certain time, one turns a cock and the liquid air runs out at a temperature of 273° below zero.

In Professor Linde's method, an air pump of 5-horse power condenses air to a pressure of 200 atmospheres; this air passes down a spiral tube and is let out in a chamber, causing great cold; then it rises and passes on the outside of the spiral tube, bathing it and thus cooling the new air that has been pumped into the tube to take its place. This cooled air follows on into the chamber, expands and again lowers its temperature, then passes on up around the same spiral tube; but as its temperature has become much lower, the new air in the tube is still further refrigerated. This circulating process goes on, until the new air pumped into the tube reaches the expansion chamber at a temperature of 273° below zero, when it drops into the chamber in the form of liquid. Thus the air, steadily cooled, is made to refrigerate the newly pumped air more and more, until the necessary degree of cold is attained.

Another idea, which may or may not be an improvement, is to have the pump and all parts of the machine kept very low in temperature.

Air in the cheap, portable form of a liquid rich in oxygen can be used for many purposes in manufactures and the trades. The discovery of a cheap method may be of importance to American manufacturers.

Electrical Progress.

Mysteries of Nature of Light and Electricity.

It has been announced that Dr. P. Zeeman of the Amsterdam University, while working at Leyden, discovered that the lines of a metallic spectrum are broadened when the source of light is in an intense magnetic field. The experiments of Dr. Zeeman were most rigorously and accurately conducted. Both emission and absorption spectra were examined with a large Rowland grating spectroscope, and the results were marked and certain. The meaning of the fact is clear to those versed in electro-optics, and, indeed, some such broadening had been predicted by several physicists, and sought for by others. Dr. Lorentz of Leyden, from theoretical considerations, ventured the prediction that the light at the edges of the broadened lines will be found to be polarized. This was completely verified by the experiments of Dr. Zeeman. The discovery will probably substantiate the hypothesis that radiation is due to the motion of electric charges, whether free or associated with the vibrating molecules of the luminous body. It has seemed more and more likely, as knowledge of ether-physics has advanced, that radiation could not be excited by the motions of the inert molecules of matter, but must of necessity require their electrification. The new facts apparently demonstrate that this is true, and throw another ray of light upon the still obscure subject of the mechanism of radiation. Of course, the principal bearing of the discovery is upon the theory of light. It is a step toward more complete knowledge of the means by which the particles of a body at high temperature disturb the adjacent ether. It contains also the germs of conclusions regarding the nature of radiating and absorbing matter which may go far toward extending our knowledge of molecular and ether-physics. There is little doubt that the solutions of the two mysteries, the nature of light and of electricity are destined to be simultaneously attained.

Electricity in War.

In the way of torpedoes, dirigible and otherwise, considerable progress has been made, so that the torpedo is now probably the most effective instrument of destruction that can be employed in offensive warfare. Against this weapon no armor plating is effective and other means of defense have been necessarily resorted to. Of these the searchlight is doubtless the one most relied upon. But this is by no means the only role in which electricity will appear in the next great war. Triangulation by means of the Fiske electric range finder now enables a gunner to plant a missile with great accuracy upon an enemy's fortress or his man-of-war, and other devices, notably of the type of Prof. Badt's electro-magnetic sentinel, will give warning even in the darkest night or the densest fog of the approach and exact position of any man-of-war.

During the past few years the United States Engineering Corps at Fort Wadsworth have been engaged in accurately plotting the approaches to New York harbor, so that the positions of all buoys and landmarks are accurately known. The elevation of each gun required to drop a projectile upon any one of the plotted points would, therefore, in the case of war be no longer a matter of experiment, and doubtless the same is true of other harbors abroad.

With electro-magnetic sentinels judiciously placed in the approaches to a harbor at a distance too great for the invader to reach the city with shells, almost the exact position of an invading vessel, the direction of its course and its speed would be known during the darkest night as well as in the brightest day.

Americans have been constantly reminded of their barbarity in permitting the use of the overhead trolley, and have been told of the greater civilization of the countries of the old world, where no such unsightly intrusion is permitted; but the trolley now seems to be making its inroads in France and Germany with remarkable rapidity. Even in Paris overhead wires are being talked of for the transportation facilities of the coming exposition of 1900, and in the provincial cities of France, as well as in the great majority of the cities of Germany, the American system seems to have gained a firm hold. That the overhead wire is unsightly is not to be denied, and ultimately, no doubt, it will have to give way to some less objectionable form of power communication; but that it is a necessary intermediate stage of the solution of the rapid transit question must be admitted, whether the admission be welcome or not.—Cassier's Magazine.

W. N. Hartley and H. Ramage have recently examined a large number of ores and minerals by means of spectrographic analysis. Most notable is the wide distribution of gallium, which was found in 68 out of 168 specimens, occurring in most magnetites, bauxites and blendes, and nearly half the clay ironstones and manganese ores. Rubidium appears to be even more widely distributed, occurring in most iron ores. Indium was found in thirty minerals, including all the carbonates of iron and tin ores and most blendes. Thallium, while less widespread, was frequently found. Iron and sodium were found in every specimen and potassium in all but two, one a blende and the other a tin ore. Calcium, copper and silver were found in all but a few cases. Such a wide dissemination of gallium and indium is unexpected, and the same might be said of silver. Among metals not looked for by the authors, titanium is known to be found almost universally, and possibly the same is true of gold.

Houston and Kennelly have lately presented to the American Philosophical Society an elaborate paper, in which they have sought to demonstrate that the insulating substance surrounding an electric conductor is the true path of the current. The Edison Company of New York is reported to be substituting the Thomson mechanical wattmeters in place of the old chemical meters. Following out the interesting experiments of Becquerel, which showed that certain salts of uranium, after exposure to sunlight, emitted radiations which, like the Rontgen rays, were capable of effecting photographic sensitive plates through intervening opaque substances, Professor McKisick of Auburn, Ala., as the result of numerous experiments, announces his belief that the Becquerel ray is the connecting link between the ordinary light and the Rontgen ray.

The development of the electrical industry and popularity of the pneumatic bicycle tire have so largely increased the consumption of India rubber without any increase in the sources of supply as to make the question of how to meet the demand an exceedingly serious one. That this situation will stimulate the inventive faculty to supply an artificial substitute there can be no question, and should success be met with the prospective rubber famine will be a blessing. There have been many rubber substitutes, and while some of these meet some of the requirements, they have so uniformly failed to meet others that the announcement of a new one, however well indorsed, fails to create a ripple in the rubber market.

Mining Summary.

CALIFORNIA.

Amador.

Record: At Oleta good rock was struck in the 450-foot tunnel at the Monte Christe mine last week. This proves that the mine is quite extensive. Mr. Dillon intends to build a new mill at once and begin crushing ore on a large scale.

The directors of the Potazuba Company held their regular monthly meeting this week, and call No. 8 of 3 cents per share was levied on the subscribed stock. Sinking at the mine is going on rapidly. During the last twenty days, since sinking began, the shaft has been put down 40 feet and is now 285 feet deep. The ledge still continues in the bottom and the prospects at the mine are good.

Dispatch: The Iron Mass mine, near Volcano, owned by A. B. McLaughlin and others, is showing encouraging prospects. A steam hoist will at once be put up and the shaft sunk to the 1000-foot level.

At the Gwin the rich rock still holds out, and the returns from the mill are very encouraging. The Gwin will pay a dividend for April in excess of the one for March.

At the annual meeting of the stockholders of the Union Consolidated Mining Company the following were elected officers: President, Capt. Matson; secretary, G. E. H. Baker; treasurer, J. B. F. Davis.

The excavation for the foundation of the new mill at the Argonaut will be finished in a week, when the work of laying the concrete foundation will begin. The ore still yields well.

Butte.

Register: At Enterprise the Red Point mine, under the management of Josiah Champion, is rapidly being developed. The tunnel is in 570 feet on this mine and drifts are being run in two directions from the face of the main tunnel, while an upraise of 400 feet will be made.

Mr. Murray, who has recently bought the Alm Brothers' mine, will soon put up a 5-stamp mill.

At the Chrystal Hill mine the 5-stamp mill is running steadily and crushing good paying quartz.

Calaveras.

Prospect: At the Burgess mine, which is being operated by the California Exploration Company, the work of sinking progresses steadily and a depth of 180 feet has already been reached.

The Pine Log, near Copperopolis, is working thirty men, and the 20-stamp mill is running day and night. Last month a dividend of $8000 was declared.

The 700-foot mark has been reached in the shaft of the Thorpe mine, at Fourth Crossing, and preparations are under way to run a level to cross-cut the vein. When that is done, sinking for another 100-foot stretch will be renewed.

The shaft at the Bund mine, between Fourth Crossing and Altaville, is down 274 feet and sinking still continues. At a further depth of 26 feet it is the intention to run a level, cross-cutting the ledge. The 200-foot level shows a vein 25 or 30 feet wide.

On the Wells mine, at Fourth Crossing, nothing is at present being done, the Exploration Company having relinquished their bond.

Some rich rock was struck in the Esperanza mine, at Mokelumne Hill, recently. The company are still engaged in sinking their three-compartment working shaft, which will be pushed to a depth of 1000 feet.

A 4-stamp mill is being put up on the Edna mine, in Spring Gulch, and new buildings are being erected. The mill will be used simply for testing the ore as sinking progresses. It is the intention of the company to go down 1000 feet.

Page Cutting, of Murphys, has bonded to Rigney, Blanding and Howk his gravel mine, the Round Butte, in Table Mountain district, for one year, for $3000, $500 of which amount was paid.

The interest of Reed, Solinsky and Reddick in the Lafranchi mine, at West Point, is bonded to J. A. Faull, for one year, for $3000.

The old Calaveras quartz mine, near Sheep Ranch, is to be reopened, and the work of pumping the water out of the old works is in progress. The property has been bonded to a San Francisco company. The mine has been idle for eight or ten years, notwithstanding that over $60,000 were taken out, with no deeper development than 600 feet. It has a 12-foot ledge of high grade ore. The company proposes, when the water will have been pumped out, to put up good, substantial machinery and drive the shaft down to a depth of 1000 feet.

Ledger: The Paragon, Mountain View, Tip Top, Bullion and La Palomacita locations near West Point are being opened up. It is proposed to run a 1200-foot tunnel which will tap them all. At present three tunnels are being extended into the Bullion, Mountain View and La Palomacita, and a 10-stamp mill is being erected, and 1200 feet of pipe is being laid to bring water.

Chronicle: Another large body of good ore has been found at the Gwin, this time on the 1400-foot level. Although it is not as rich as that taken from the 1300-foot level last week, still it is remarkably rich ore and will probably go away up in the hundreds per ton.

In the Steep Gulch mine on French Hill, owned by M. Nunes and C. Murphy, there has been a tunnel run in from the gulch which taps the lead at a depth of about 30 feet, at which point it shows a width of nearly 5 feet.

Toda and Schrack are still at work on their mine, which is situated on Toda ranch. The bedrock tunnel has now reached a length of 700 feet and it is expected to tap the gravel channel any day.

The hanging wall vein in the South Paloma shows up at a width of 5½ feet. The shaft is down 560 feet. Forty feet more will be sunk, making 600 feet, when stations will be cut and the work of cross-cutting will be commenced.

Inyo.

Register: L. F. J. Wrinkle went north last week to buy the Confidence and Mendocino mines, Funeral range, northeast of Panamint. The present owners are offered, for the two, $100,000, a guarantee that $100,000 worth of work will be done, and one-fifth of non-assessable capital stock.

Wm. Birchim will shortly begin developing his silver mine, the Indian King, east of the White Mountain summit.

Operations at Copper Mountain were scheduled to begin May 1st. Heavy storms have damaged the water ditches greatly, and repair work will be the first thing in order.

Nevada.

Telegraph: A crushing of eighty-nine tons of ore has been completed from the Wisconsin mine near Grass Valley. The result was $30 per ton, or $60 per load. The ore crushed came from the No. 4 level north, and the ledge is a good-sized one and there is a great deal more of the same quality in sight.

Union: A contract has been let for sinking a shaft on the Reddick mine on the Blue Tent road above Nevada City 430 feet.

Thomas, Curtis, Griffin and Horrell have leased the gravel mine at Randolph Flat. The tunnel is now in about 1500 feet.

A contract has been let for sinking the shaft at the Independence mine another 100 feet. Chavanne and Fricot are developing the property.

There has been struck a fine body of ore in the Massachusetts Hill mine in the shaft at a depth of 1300 feet. The vein is 3 feet in size, of fine quality milling ore, and has every indication of permanency. The company has been prospecting the Massachusetts Hill for over a year with indifferent success. They had every confidence that they had a good mine could they but discover the pay chute.

Placer.

Argus: A large force of men is working on the dam at Canyon creek for the Gold Run Mining Company.

At Weimar the Belle Union mine is to be equipped with a rock-breaker, self-feeder and concentrator. They intend running a ditch from Joe Brown Flat for water supply.

Sentinel: W. B. Lobner, H. S. Tittle and J. Zuver of Auburn have secured a four-year lease on a quartz ledge below the Georgetown road about one mile from Auburn. The ledge is from 3 to 4 feet wide.

James R. Hines of Weimar has been prospecting his Yellow Jacket ledge. The vein in some places is 16 feet wide.

Since the snow has melted at Westville work has been resumed at the Herman mine with a force of twenty-eight men. The company are preparing to use compressed air conveyed from a power plant four miles distant.

The Hidden Treasure Mining Company has purchased ninety tons of 30-pound steel rails. The rails are the same size as the ones used by the Nevada County Narrow Gauge Railroad. The rails will lay 2¼ miles of track and will be used in the main tunnels of the company's mines. The Glen Gravel Mining Company has purchased 3000 feet of rails to be shipped at the same time.

Plumas.

National Bulletin: J. F. Cummings and V. B. Allen, of San Francisco, are prospecting the Bushman gravel mine, north of Emigrant hill, owned by Goodwin and Thompson, and bonded for a limited period to the parties named. The mine is undeveloped, but indications point to a good property. Fine prospects have been found, and the channel is traceable a long distance.

Independent: Plumas T. Turner has started a tunnel to tap the gravel deposit in Union Hill, on the north side of Onion valley. This locality for many years has been the subject of speculation and favorable mention, but the task of exploring it was beyond the means of local miners.

San Diego.

Ramona *Sentinel*: R. Melrose has leased the Old Blue mine and is driving a tunnel.

The Ready Relief mill is running on fifty tons of Redman rock that assays well. Bailey Bros. are working one shift in the Ready Relief and two shifts in the Redman.

Mr. Tainge, of the San Diego mine, is soon to return with machinery to handle the water in the mine.

Shasta.

Free Press: Extensive preparations have been made at Keswick for the reception of the directors of the Mountain Copper Company, who will visit the property this week. A general cleaning up of the property has been made. Two furnaces have been running steadily, but during the directors' visit all three of them will be in operation. A new locomotive for use on the Iron Mountain railway has been ordered, and when delivered there will be four in use. This will necessitate the employment of more miners in getting out a larger quantity of ore to supply the ore trains and the smelters.

Searchlight: Director Chas. W. Fielding of the Mountain Copper Company has arrived from London, and is now at Keswick and Iron Mountain. With him is Louis T. Wright of London, who will succeed Alex. Hill as general manager of the company's properties. Mr. Hill will devote his entire energies to the development of the Balakalla group, which he recently bonded, and where a force of men are now engaged in opening up the ore body.

Siskiyou.

Journal: In the Steamboat mine, on McAdams Creek, under the supervision of Superintendent Brokaw, the machinery is excellent, and will, no doubt, keep the mines clear of water which has been a great drawback in working the property in the past.

The Chinese Company, at Hamburgh Bar, who are working the old Garrett mine, are accomplishing some good work. They have had very little trouble this spring with high water after the first freshet, when a portion of their dam was carried away.

The Nannetta B. mine, on Thompson Creek, which is owned by the Colorado Company, is still being successfully worked. This plant is one of the best in the county.

The Seattle placer mine, in the same locality, may be started up again, as the owners were put to a considerable expense in fitting it up. This is the old Shinar mine, which was always considered a good property. It was sold to the Seattle Placer Mining Company a couple of years ago for $10,000.

Vogan & Matthews will work the Classic Hill mine, on Indian Creek, near Happy Camp, this season.

The Klamath river dredger is now a few miles below Oak Bar. The dredger has been at work almost continuously since it was first built, which is a good indication that it is a paying proposition. At the time the dredger was built many old miners were skeptical as to its practicability on such a turbulent stream as the Klamath.

The Bunker Hill mine, near Happy Camp, is being worked this season with renewed energy.

A large pump from mouth of Barkhouse Creek, Klamath river, is to be used at the Greenhorn blue gravel mine, which it is expected will be able to handle the great amount of water in that claim at present. Hunter and Smith have been troubled considerably by water since reaching a depth of over 90 feet in the shaft. As soon as the water can be kept out, they will be able to reach the blue gravel at bed rock, over 110 feet below the surface.

News: The Horse Creek Mining Company have their ground stripped off and have made a partial cleanup, which shows a good yield of coarse gold.

The Salmon River Hydraulic Mining Company are extending their ditch about a mile further down the river for the purpose of working a low bar.

Golden and Eveleth are running a new tunnel on the Brown Bear and expect to strike the ledge in a short time.

The Black Bear Company will drive a new tunnel to tap the ledge at a lower point than has ever before been reached. The owners of the mine have profited greatly by the new wagon road which enables them to get heavy machinery to the property, which it was impossible to handle by pack trains. The mill has been running steadily on ore of good grade. About a dozen Chinamen are employed in the mine.

William Klein is taking good pay from his hydraulic mine at Sawyer's Bar, and makes a rich cleanup about once a month.

Chris. Jensen is piping on McKinney Creek with good prospects. He has plenty of water.

Tuolumne.

Independent: At Columbia D. Harrie and J. Lenox of Oakland are making preparations for opening up a gravel mine on the south fork of the Tuolumne river, at the mouth of Clark's gulch.

Work on the Sunset mine has been resumed. The machinery is now on the ground.

At the Alabama mine very high grade ore has been struck in the incline shaft. The vein is quite large and gold shows up freely to the naked eye.

An increased force of men will be added to the working of the McKenna mine in a few days.

Union Democrat: At the Rawhide the main shaft is down now nearly 1100 feet, with sinking going steadily on. Most of the ore sent up for reduction comes from the stopes between the 1000 and 900 and 900 and 800-foot levels. A big force is drifting north on the 800-foot level.

The shaft in the Alabama is now down 245 feet, and being driven a foot deeper every day by the contractors. A water station has just been completed at the 200-foot level.

Placer mining at American Camp, eight miles above Columbia, is picking up briskly. Within a radius of a few miles from that point are a number of good properties that will yield well when properly worked.

A few miles above the Camp is a section known as the Philadelphia Diggings, which is reported as very rich. A Stockton company are acquiring a number of claims in the district, and are spending considerable money for the purpose of securing water with which to wash their gravel. The preliminary surveys for a ditch have been made, which will carry a steady supply of water from the Stanislaus river.

The old Riverside mine, four miles above Italian Bar, on the Stanislaus, has been bonded to a syndicate who propose to commence active operations immediately.

The Gray Eagle, at American Camp, will soon be running full blast. A 6-foot vein in slate has been uncovered.

The Royal mine, at Experimental gulch, has a small force of men at work and from developments is proving a good proposition, with 5 feet of free milling quartz.

The Omega gravel mine, owned by C. W. Ayers and S. S. Bradford, has been sold by them to a Scotch syndicate for $40,000, of which $10,000 has already been paid, and the remainder will be forthcoming shortly. The property is situated on Table mountain, between the Alabama and Rawhide. Operations on an extensive scale will be commenced at once.

Yuba.

Nevada *Transcript*: The tunnel at the Good Title mine is in 600 feet, and the shaft from the tunnel is down 160 feet. In the shaft a few days ago a large shoot of rich ore was struck. The ledge is 11 feet 8 inches wide. There is also another shoot of ore coming in. A run of four days with the 5-stamp mill yielded $1500. The owners of the mine have located six more claims in the vicinity. They will put up a 20-stamp mill soon and work the mine on an extensive scale.

NEVADA.

Walker Lake *Bulletin*: At Silver Peak, in Chiatovich's tunnel, the ledge started on a month ago is looking and producing well. The pay streak is 6 feet wide. In ten days the ground will be opened so that stoping on the ore will commence, when a few men can keep the 10-stamp mill running.

The Valcalde Brothers are running the O'Hale mill on ore from their mines and are doing well.

The owners of mines in the White mountains, above Fish Lake valley, are to begin work as soon as the snow goes off.

Elko *Free Press*: At Tuscarora the Dexter has moved its cyanide plant to the De Frees mill across the valley.

A rich strike is reported made in the Coptis, owned by the Dexter Co. It is reported that the company will put up a 10-stamp mill.

Work has begun on the Young America East; probably will begin on the Poorman June 1st.

Pioche *Record*: Last fall the old Pacific tunnel, east of the Meadow valley divide, was opened up and work on it pushed to reach the Yuba vein. The porphyry dike was reached but no ore found, and the first workers gave it up. Later the work was prosecuted by V. Lloyd and J. Cook, and drifting was begun, which, after running something like 100 feet, developed a bunch of galena ore, rich in silver.

The extreme southern part of Lincoln county, that bordering on the Colorado river, will this summer experience a mining boom. Three mills are in operation at El Dorado canyon and points below, on ore from lode claims which heretofore have claimed the bulk of attention given to mining in that section, and all are doing well.

The Temple Bar Con. Mining Company, organized in San Francisco under the laws of Arizona, is formed to work placers in the Colorado at Temple Bar. The company's property embraces 1700 acres. A 600-horse power engine will be erected for pumping purposes. It will be the largest in the State for hydraulic purposes and will lift 17,000,000 gallons of water every twenty-four hours. The water power will be 125-foot head, and the company expects to work from ten to fifteen hydraulic giants. An electric plant will form part of the machinery put in, and all the machinery will be located on the Nevada side.

Gold Creek *News*: Captain Pinder is expected back from San Francisco next week with machinery for the hydraulic elevator which will be placed in Hope gulch. Sluicing will begin in Hope gulch. This ground was nearly all washed over by Penrod years ago. It is the plan to run through the old tailings and to wash down the hill slopes that were left. The sluice boxes are elevated to a height of 40 feet and have a fall of 7 feet in 160. At the end of the box are 40 feet of tables for catching the black sand that goes off in the tailings. These tables are about 12 feet wide and have 4000 augur holes filled with mercury.

Silver State: About Ely and Cherry Creek, in White Pine county, everything is picking up on account of the revival in mining.

The Star and Gray Eagle properties at Cherry Creek are being improved extensively. Pumping and hoisting works are being erected and a concentrator will go up soon. The pump will be the largest in operation in the State, having a capacity of 3000 gallons a minute.

The Newton Dunvan mine of Kinsley has about 1200 sacks of low-grade ore out for shipment, and should the returns meet with their expectations the owners will continue extracting ore for shipment.

A 5-stamp mill is to be put up shortly at the Ben Hur gold mine, twenty-five miles from Cherry Creek.

The Chainman mine at Ely will have a good-sized mill soon. Bids are now out for hauling 132,000 feet of lumber. If present intentions are carried out an electric light and power plant will be erected and operated in connection with the mine and mill.

Lyon County *Times*: Nearly all the machinery has arrived for the Peck plant in the Douglass mill.

It is reported that Spragg & Martin have sold their copper mine in Mason Valley for $13,000, to the same parties who bought the Dobbins mine.

The work of running the tunnel on the Dobbins copper mine in Mason Valley is progressing. The new company has four men at work, and the whole tunnel is said to be in first-class copper ore.

OREGON.

Rogue River *Courier*: Marteen Brothers cleaned up last week on the Althouse and got $3000 from the sluices.

Crow & Taylor will ship another carload of ore from Merlin to Ashland on the 10th.

Horner and Savage of the Seattle Dredger Co. are out on Silver creek looking up placer interests. A survey will be made and ditches dug this season.

River bar mining will soon be in operation if the dry weather keeps up, though there is more snow in the Siskiyous than usual at this time of year.

The Coast Range Mining Co. is putting in a pumping plant near Woodville.

The Hampton-Lewis placers are operating two giants night and day with sixteen men.

Grant's Pass *Observer*: Fox & Co. are working on a copper deposit near Waldo that promises well.

Belding & Dowell's 5-stamp mill is running on good ore from their Green's creek mine.

Copper ore that carries from $3 to $8 in gold is reported found near Browntown by Smith & Thurshburger.

The Rocky Gulch Co. made a partial cleanup last week which was very satisfactory. They will have plenty of water to run nearly all summer.

The new 5-stamp mill at the Jewett mine will be ready to start up in about ten days.

They have about 200 tons of ore on the dump ready to haul to the mill.

Baker City *Democrat*: The Elkhorn Mining and Milling Company has been incorporated to acquire the Snow Flake, Big Spring, Calumet, Monitor, Gold Bug, Hecla, Silver Bug, Tip Top and Willamette mineral claims in Baker county; capital, $1,500,000.

The shaft on the Con. Virginia is down 55 feet, and the depth attained for the month was 75 feet. Sinking will continue for an indefinite period.

WASHINGTON.

Spokesman-Review: The Bridgeport Mining and Milling Company will push development on their Mineral hill properties in the Okanogan this coming season. The tunnel already started and in 65 feet will be continued into the mountain for 1500 feet, which will give a vertical depth of 800 feet.

BRITISH COLUMBIA.

(Special Correspondence).—Boring for coal has been suspended in the immediate vicinity of Vancouver. The seams found within a thousand feet of the surface were but a few inches thick. In the meanwhile metal mining is being carried on practically in the city itself. Ore has been located at Lynne Creek, North Vancouver, carrying values to the extent of $27 in copper and gold.

Nothing is talked about on the Seaboard just now but the free milling propositions owned by Vancouver people. There are many smelting prospects at Vancouver's very doors, but they are not in good favor just now and it is next to impossible to dispose of treasury stock for development work. On the other hand, the free-milling properties are no sooner stocked than there is a rush made for shares before the price is raised.

In Lillooet the road to the Golden Cache mines is built, and the mill plant is in process of erection, while the Alpha Bell and Gold Weef propositions are being developed with abundance of money in the treasury from the sale of stock.

Vancouver, May 8th, '97.

The shipments of ore and matte from Kootenay, notwithstanding the difficulties encountered, are gradually coming up. For the week ending May 1, the shipments showed a value of $48,863.74, swelling the total amount for the year to $2,641,291.68, an average of $660,322.92 per month. The following table gives the sources for the year to that date:

ORE EXPORTED.

	Tons.
From Slocan via Kaslo	9,798¼
From Slocan via Nakusp	2,642½
From Rossland via Northport	6,479¼
From Rossland via Nelson	52
Total	18,990¼

Total value—	
Through Nelson custom house	$1,104,184 32
Through Revelstoke (Nakusp)	292,110 65
Total	$1,396,294 97

Average value per ton, $73,526.

PRODUCE OF SMELTERS (SHIPPED).

	Tons.
Nelson (Hall mines) matte	582
Trail smelter matte	2,319¼
Total	2,901¼

Total value, $1,241,995.71; total value of ore and matte exported, $2,641,291.68.

Spokesman-Review: It has been definitely decided that the Le Roi smelter will be built by the Le Roi Company, instead of by a new company to be made up of individual members of the Le Roi and outside individuals. This will call for heavy expenditures out of the Le Roi treasury for several months, aggregating about $100,000. Still it is expected that the company will continue to pay its regular monthly dividend of $25,000. In addition to this the company has cut out a great deal of development work in the mine, and will improve its plant by putting in additional machinery. With its new machinery, just put in complete working order, the Le Roi mine can hoist 500 tons of ore daily.

In the Fort Steele country the North Star will ship 6000 tons of carbonate ore this season. The sulphide ore is not being taken from the mine. The carbonates which will be shipped will probably average 62 per cent lead and 40 ounces of silver to the ton.

The expected exodus to the North Fork of Salmon river has commenced. From ten to twenty people leave the cars daily at Gillam's and strike into the mountains.

Largely owing to the promised building of the Crow's Nest Pass Railway by the Canadian Pacific people, the rush of miners, prospectors and capitalists to the Fort Steele country this year will almost amount to a stampede. Bonner's Ferry is one of the chief outfitting points for the camp, and although the season has hardly opened, parties arrive here almost daily and leave for Fort Steele over Wild Horse trail, which is easily fifty or ixty miles the sortest route.

The Rico, which has paid $187,500 in dividends, is now developed about 6000 feet in the seven tunnels. Thirty men are employed in extending all of the tunnels. The concentrator and tramway recently ordered will be finished by September 1. The tramway will be a mile aad a quarter in length. When the concentrator and tramway are completed they will commence to mine the vein on the original discovery. This vein will average 12 feet in width on clean and concentrating ore.

A sixty-ton concentrator has been ordered for the Jackson mines in the Slocan. George Alexander and his associates are owners of the property.

ALASKA.

News: In the Berner's Bay district the Julian Company put up a 10-stamp mill last season and since the first ton of ore was milled they have had an exceptional run of prosperity, saving the three months' shut down this winter necessitated by a shortage of water.

This season two other companies are beginning operations in that district. The Portland-Alaska Company, at the head of which is L. Nicolai of Portland, is erecting a 10-stamp mill on the Horrible group, the mill timbers and machinery being already on the ground.

A mining man of Butte, Montana, has purchased the Greek boys' property, and under the management of D. E. Lutes is preparing to build and equip a 10-stamp mill.

In the Sum Dum district the Sum Dum Chief Mining Company has a force of men at work on their new mill and tramway, which they hope to have completed and ready for ore by the first of July or August.

In Silver Bow basin at the Nowell placers the two giants that were in use last season will be employed this summer. The same company will operate their 20-stamp mill as soon as the tramway leading to the mine can be used.

The Alaska-Juneau Company, purchasers of the Campbell mill of thirty stamps, will run steadily during the summer and a very large amount of development work will be done by the company. A diamond drill will be employed in prospecting the ledge at a low depth, it being the intention to sink several holes at least 1000 feet deep.

On the Webster property men have been employed all winter driving tunnels and blocking out ore, and their mill will also be set to work at an early day.

The Ebner Gold Company's plant is the only one in the basin which has run during the winter. The capacity of the Ebner mill will be doubled within the next ninety days, the additional machinery having already been ordered. By the middle of June the entire basin will be a beehive of industry and will afford employment to 300 or 400 men.

IDAHO.

Spokesman-Review: The superintendent of the Hiyu mine in the Florence district in his report to the directors states that there is ore enough in sight to run a 10-stamp mill for two years. The work of development is being pushed with six men employed. The directors say that they will have a mill on the ground inside of three months.

Silver City *Avalanche*: The Trade Dollar Company has secured a 90-day extension of time upon its bond on the Alpine group, belonging to Lewis & Nichols, and will continue development work.

UTAH.

Salt Lake *Tribune*: At Marysvale, in the New Crystal Company's property, the incline has been run 350 feet on the ore chute, the ore showing a valuation of $4 in gold, 30 ounces silver and 30 per cent lead, and spreads out blanket-like between the porphyry and quartzite, and at times is as much as 5 feet in thickness. Ore is now being extracted and shipments will begin in a short time.

At the Webster the pushing of the main tunnel, which has now penetrated the hill 1650 feet, continues, and a large amount of ore is exposed, which shows 25 ounces silver, 23 per cent lead and gold of the value of $2 per ton. The property is owned by W. R. Hearst and others, and is managed by R. C. Chambers.

Charles D. Hank and others have secured an option on the Chattancoga, and will begin prospecting the ground at once.

Kramer and Botboldi have secured an option on the Great Western, owned by Henry W. Lawrence, and developments will continue throughout the season.

A lease and bond has been secured on the Argonaut placer at Bingham by Matthews, Bolton and Peterson, who will proceed at once with the sluicing of its sands. The bar covers twenty-three acres, and spreads out over Carr Fork. The bond is fixed at $20,000, while the holders have five years in which to close the deal.

Reports from the Sioux-Ajax tunnel are that it has now penetrated the zone to a distance of 2360 feet.

Mammoth *Record*: The new East Tintic Railway is now hauling about 200 tons of ore a day from the Mammoth mine to the mill, which amount exceeds the regular shipment of the mine since the road has been built.

Bullock & Radcliff have resumed work on the Annie Laurie.

Supt. Toll of the New State is ordering the machinery for a steam hoist which is to be put in at the property.

Mercur *Mercury*: Smith, Blake and associates are figuring on securing a lease on the Sunshine mine and mill, and, if successful, will have the property in operation in less than a month. These gentlemen were among the first to apply the cyanide process.

The La Cigale property continues to improve. The vein has grown larger and richer as depth is attained until now the width of the vein in the lower levels is not known and will not be until it is crosscut.

Hereafter the cleanup at the Geyser-Marion will be made every fifteen days, and it is expected that the total output will be $18,000 per month. It takes $5600 of this for the payroll and $1000 or $2000 more for cyanide, zinc, coal and various other necessary expenses.

A favorable change has occurred in the Daisy incline, now down about 300 feet. The ore has made into the footwall to a depth of at least 4 feet, adding that much to the width of the ore body.

The Brickyard north drift is now in about 200 feet and the good ore still continues.

Tintic *Miner*: Shipments from the district for the week are as follows: From the Bullion-Beck mine, 10 carloads ore; Bullion-Beck mill, 15 carloads concentrates; Centennial-Eureka, 1 carload ore; Uncle Sam, 4 carloads ore; Mammoth mill, 7 carloads concentrates; Utah, 3 carloads ore; Lakeview and Stockton, 1 carload ore; Swansea, 3 carloads ore; South Swansea, 5 carloads ore; North Star, 3 carloads ore; Black Dragon, 1 carload ore; Dragon iron mine, 2 carloads ore daily.

The Sioux-Ajax tunnel people are preparing to put in an air compressor at the Sioux mill, and will hereafter furnish their own power to the drills in the tunnel.

The lessees of the Cleveland mine at Mammoth commenced work on the property Saturday. The work is being done through the Sioux-Ajax tunnel.

Joseph Gerber and Jacob Hupfer have sold the Hungarian mine to Frank Knox for $15,000—$1000 down and the balance in payments to be completed in a year.

A large amount of native silver is coming out of the winze from the 1000-foot level of the Beck. The winze is now down over 50 feet below the 1000-foot level, and there is no sign of the end of the ore body.

A lease and bond will be given this week on the Black Jack and Tidal mines belonging to L. E. Riter, and development will be commenced at once.

MONTANA.

Miner: A big strike has just been made in the Anderson mine on the Parrot flat, near the Glengarry, and the mine which has been merely a promising prospect up to this time is now one of the producers. A vein of ore from 3 to 8 feet wide was cut through recently on the 200 level. The ore is of good grade and carries gold and silver as well as copper.

The Bannack Gold Dredge Company has improved their plant which is at work in Grasshopper creek. The placing of the plant at the stream where it is located has cost the company about $200,000. Last year nearly half that amount was, however, secured in gold from the bed of the creek.

On the Alice properties in Walkerville the monthly output is about the same as last month. About 300 men are employed in the mines and in the mill and there is no probability of that number being cut down in the near future.

Inter-Mountain: Judge Knowles decided a question of general interest to mining men Friday in the United States District Court. The suit was that brought by Anton Baum and others against Ross Deegan, an application for an injunction to restrain the defendant from working a mining claim in Jefferson county. The vein passed from the Buzz lode, cutting the side line, into the adjacent Amazon. On its dip it is so inclined that eventually it passed into the Buzz, although its apex was in the Amazon. The rule generally believed to prevail is that a miner may follow the vein on its dip outside the side line, if it goes there. In the case in controversy, however, the end lines of the Amazon, in which is the apex of the vein, are not parallel, one of the side lines being 85 feet longer than the other.

Judge Knowles held that the right to follow outside the side lines exists only when the end lines are parallel.

The owners of the Amazon, Baum et al, had obtained an injunction against Ross Deegan, the owner of the Buzz, to prevent him from taking any ore out of the vein that apexed in the Amazon. Judge Knowles discharged the injunction. It is understood that an appeal will be taken to the Circuit Court of Appeals at San Francisco.

COLORADO.

Denver *Republican*: The settlement of the pumping proposition in the down-town district of Leadville is of much more importance than appears on the surface of the detailed agreement published, as it means the development of a section of territory that has been only partially prospected heretofore and which promises to go far toward extending the gold district from the Little Johnny on the north to the Big Johnny on the south, a distance of between seven and ten miles. The district that will be drained includes everything from the Pendery fault on the east to California gulch on the south and west, and Stray Horse gulch on the north, and within this territory are located the Penrose, Bon Air, Welden, Bohn, Northern and Sixth-street properties, which are all producers of good ore, and will this year greatly increase the product of the camp.

Another important effect upon the Leadville mining district will be the development of the territory south of California gulch. Parties are now looking over the ground preparatory to sinking two shafts in the section south of the gulch. It is expected that it will be necessary to sink 600 feet before reaching the rich ore chute that is known to cross California gulch, and the money necessary to develop the ground is already subscribed in the event that it is decided to commence work.

At Ouray a rich strike has been made in the Commodore Foote. The vein consists of a rich body of native and brittle silver and chlorides. The vein at the opening was about 15 inches wide.

The new strike at the Guston turns out to be a wonderful find. The miners are now working in the new ore body, which is about 12 feet in width.

New prospects and mines are being opened up almost every day, and the miners are fast getting out of town and into the hills.

Arrangements are being made to resume work on the St. Paul mine, above Red Mountain. A contract will be let at once to sink the shaft 200 feet.

There were shipped from this station during the month of April 155 cars of ore, a shortage of seventy-five cars from the shipments made during the month preceding. This is accounted for owing to the regular spring condition of the Sneffels and Bachelor roads.

At Yankee a party of Eastern men who have been spending several weeks looking over the district, have taken options on several mining properties, and will at once start the erection of a new 50-ton daily capacity concentrator, which will have sufficient power to be increased at any time to 100 tons daily. The mill will be built near the mouth of Cumberland gulch, affording a down-hill pull from the mines in Silver Creek, Cumberland and Warsaw gulches.

It is the intention of the Standard company to shortly begin the erection of a large mill for the treatment of their ores.

At Idaho Springs in putting through an upraise at the tunnel of the Lamartine mine the body of lead ore has increased both in size and value. This body of ore is independent of the mine proper, where the force of miners has been increased to 150 men. Almost every one of the levels being worked is producing an exclusively smelting ore.

The Amazon and Crœsus mines, near the Dove's Nest on Seaton mountain, are being started up this week. They are among the oldest locations in the State.

At Cripple Creek the best as to the output give 14,000 tons handled by the process plants, 1500 by the stamp mills and 6000 tons by the smelters, making a total of 21,500 tons of an aggregated value of $1,075,000. The mill ores were distributed approximately as follows: Metallic extraction works, 6200 tons; Colorado-Philadelphia, 4300 tons; Gillett and Brodie, 1400 tons each; Page mills, 700 tons; stamps, 1500. These figures give the ore an average value of $50, a slight increase.

The manager of the Orpha May gives the April production at thirty broad-gauge carloads, or 600 tons, of an average value of $50. Work on the ore from the shaft bottom has commenced, the drift having been extended 40 feet from the 480-foot point.

Station for the third level from the main shaft of the Gold Coin at 330 feet depth has been completed, and drifting commenced. During the week the mine outputted 290 tons of the usual average of $35.

The Castle Creek Tunnel and Power Company are about to let contracts to drive the tunnel and also the make upraises, about 2,000 feet in all. By reason of the fact that the tunnel has not been worked for three years, a considerable amount of work is necessary to clean it up. The company also owns the Castle Creek electric light plant, and improvements will be made on this property, which will thus enable them, in addition to supplying electric light to the city, to furnish electric lights for the mines belonging to the company, and also power to run an underground hoisting plant.

The new company working the Squaw Mountain tunnel under bond and lease, now has two machine drills working in the breast, and is making 12 feet a day. The tunnel is now 1,600 feet in. Production from vein No. 4 and its cross-vein is going on heavily. Last week eighty tons were shipped, and returns show half of it to have had a value of $180 a ton, and the remainder was $40 ore. It is the expectation to make a second shipment of about 100 tons before the end of the present month.

At Fairplay the old Beaver Creek Placer Mining Company has been rejuvenated under the name of the Fairplay Hydraulic Mining Company, by Senator Reuter and others, with J. H. Abeel as superintendent. The company has 1,000 acres of good placer ground and pipes its water from Mosquito creek to the Beaver ditch, which supplies the workings with a big force of water. The company will employ from thirty-five to forty men this season on the works.

The annual report of the Pharmacist shows that during the year the company has expended $30,000 in sinking and equipping the new shaft and in opening the mine, and has cleared in addition sufficient to lift the indebtedness of the company, about $11,000. The year closes with the property entirely out of debt and with one of the best equipped mines and best opened ore bodies in the district.

In Clear Creek County on the Bellevue-Hudson mine on Columbia mountain, the vein has widened out to 13 feet 6 inches in thickness. The shaft has reached a depth of 600 feet from the surface and 125 feet below the level of the tunnel. A tunnel from the base of the mountain is in contemplation. Shipments of the ore, which is of a good grade in silver, are regularly made.

NEW MEXICO.

Silver City *Enterprise*: At Mogollon in the face of the main adit level of the Confidence mine a large body of ore has been encountered which is of higher grade than the ore recently milled. The vein at this point is 12 feet in width and the ore body over 4 feet wide and increasing in width.

On the Maud S a body of high-grade ore has been struck on the 375-foot level. Another strike has been made on the 150-foot level and is supposed to be the upper portion of the ore body found below.

John T. Mitchell who came from Denver to expert the Tellurium mines on Little Dry creek has secured an option on the property and will commence work immediately.

ARIZONA.

Phœnix *Republican*: Downes & Burke of Huachuca have bonded their mine.

The Excelsior Mining Company at White Hills, has recently erected a 40-stamp mill on their property.

In the Russellville district in Cochise county the old Peabody mine, which has been a large producer, was some months ago bonded to Fiege & Joerss and since rebonded by them to a Philadelphia and English company. The company has purchased a diamond drill and will thoroughly exploit portions of the Peabody ground which have never yet been opened up.

Prescott *Courier*: In the northern part of the Territory there are sixteen men at work in the Minnehaha and Bismuth claims, upon each of which 500 feet is to be sunk. The Minnehaha has a double compartment shaft, the Bismuth a single.

A cyanide plant is to be put in to work over 400 tons of tailings from the old Fortuna mine. Men are now at work erecting this plant. The Fortuna mill will start up in a few days.

Nogales *Oasis*: The Empire Smelting Company have got into place the two hoists on their mines—the Flux and Hardshell. It is the intention to have a month's supply (2,400 tons) in the ore bins at the smelter before blowing in, so when the fire is again lighted a long run can be made without running short of rock.

From Mine to Mint.

By D. K. TUTTLE, Ph. D., Melter and Refiner of the United States Mint at Philadelphia.

The great increase in the production of gold in recent years is not attributable alone to the discovery or opening of new fields. It is largely due to the use of better business methods in the working of time-honored processes, but more largely to the introduction of new means of extraction, which, whether worked alone or in combination with the old, make it possible to treat with profit immense quantities of low-grade ores in known deposits of so-called refractory ores which have hitherto defied profitable treatment.

If space permitted, it would be interesting to take a glance at the whole field of gold getting, but it is hoped that some notes on the later and perhaps the coming methods of extraction may prove useful.

It is likely that the stamp mill and amalgamator process will survive as long as we have free milling ores. But the day of letting rich tailings go to waste has passed or is rapidly passing away.

The Robinson mine in South Africa furnishes an admirable illustration of what modern methods can accomplish in supplementing the stamp mill.

In 1893, 94,842 tons of ore were worked—first by the familiar method of stamping and amalgamation. The yield from the stamps was $1,885,583. The tailings, instead of being allowed to go to waste, were passed over Frue vanners, by which sulphurets to the amount of 2714 tons were obtained. These concentrates were roasted, treated by chlorination, and yielded $219,514.

The tailings from the concentrators, amounting to 55,200 tons, were passed on to the cyanide works, where gold to the amount of $289,722 was recovered. A statement of these returns would show:

	Per ton.
From mill	$19.88
From chlorination	2.32
From cyanide	3.05
Total	$25.25

It will be seen that more than 20 per cent of the returns came from the tailings treated by modern processes, and that these added 27 per cent to the output from the stamps. These results should be very suggestive to mine owners.

It would be a platitude to say to any intelligent mining man that no one process is suited to all ores; but it has not been so well understood that no single process is likely to afford the largest possible returns from any one ore.

The concentrates in the case of the Robinson mine were collected at very low cost while the tailings were passing from the stamps to what would have been the dump. Yet they yielded $80.88 per ton by chlorination. The tailings from the Frue vanners cost nothing for crushing, yet they yielded more per ton than some ores profitably treated in this country.

The chlorination process has found its way into quite extensive use in the United States, and much more may be expected from it when, as is hoped, water power expended in the electrolytic decomposition of common salt for the production of chlorine may dispense with the transportation of chemicals to remote regions. This seems to be one of the possibilities of the future.

The limitations of the cyanide process are beginning to be understood and its possibilities will become more apparent as this knowledge is extended. Its failures are what might have been expected with the experience of to-day. That it has a brilliant future no one can doubt who has kept pace with recent developments. It is suited to but a limited class of ores, yet these are plentiful. The ores of the Mercur mine in Utah would be valueless for treatment by any other known process. It is best suited for silicious or limestone ores, in which the gold is finely divided. It will make a fair extraction from pyritic ores in which oxidation has not begun. It is suited to old tailings weathered and leached by rains, and to new tailings where the leaching is made too slow by slimes. Any difficulties here are likely to be mechanical ones.

It is not suited to ores carrying coarse gold, as the time required for solution is too long. It has not been successful with ores carrying copper, which seem to have a destructive action on the cyanide solution. Partially oxidized pyritic ores or tailings must be rich enough to pay for a preliminary alkaline leaching.

A comparatively simple chemical examination will determine the treatment best suited for any gold-bearing material, and many an expensive mistake has been made by subjecting a valuable ore to a treatment admirably adapted to some other and quite different mineral deposit.

It is now fully understood and appreciated that oxygen enters as a necessary element in the reaction by which gold is dissolved by potassium cyanide.

Efforts are being made to supplement the cyanide solution with oxidizing chemical, but while much may be hoped from experiment in this direction there is as yet no assured success to note.

(To be Continued..)

Shaft Sinking Accounts.

There are being sunk at the present time in California more shafts to considerable depths, from 500 to over 2000 feet, than ever before in the history of mining in this State. Data as to the cost is of value in making up estimates, but of this very little is available, mainly because such a small proportion of the mine managers have time to keep or appreciate the value of segregated accounts. In no part of the world has more been done toward developing the best of modern methods of mining the precious metals than in California, but probably in no other important mining field is so little attention paid to the keeping of accounts. The main value of detailed statements of costs of all kinds of work about a mine is not in that it is a check upon leakage, but as a guide for future work and as a reference. No mine owner or manager who has looked into the affairs of any old mine but has bewailed the fact that so little data is available, not only as to costs but as to what work has been done.

Mark B. Kerr, superintendent of the South Paloma mine in Calaveras county, has sent some data as to the details of cost of sinking 550 feet on that mine. It will be seen that the average cost per foot was very low. This was due in large measure to careful and economical management. The size of the shaft is 5x7 in the clear, with one working compartment and a ladderway. The power used was steam. The timbers are of Oregon pine and 12x12 inches in size:

Wood (20 cords per hhd. ft. @ $4.50 per cord	$ .90
Candles	.20
Powder and fuse	.50
Top labor	2.50
Timber and lagging	2.00
Oil for light	.05
Engine oil	.05
Steel and charcoal	.05
Management and office	2.25
Water for boiler and air blower	.20
Mine labor (contract)	7.00
Total per foot	$15.70

Of Commercial Importance.

DEPARTMENT OF THE INTERIOR, UNITED STATES GEOLOGICAL SURVEY, DIVISION OF MINING STATISTICS AND TECHNOLOGY.—WASHINGTON, May 8, 1897.

I have received the following cablegram from Coolgardie, West Australia, to which I beg to call your respectful attention and trust that our American mining machinery will be exhibited in a manner creditable to the country and profitable to our manufacturers:

"Kindly distribute among American manufacturers: International Exposition gold mining machinery under Government auspices opens Coolgardie, October 1st. (Signed) Williams, Secretary, Coolgardie."

Very truly yours, DAVID T. DAY, Chief of Division.

What a Good Many Say.

THE MINING AND SCIENTIFIC PRESS is the best and has the largest circulation of any mining journal in the world. No practical miner should be without it.—Colfax, Cal., Sentinel, May 7.

The Debris Troubles.

(From our Special Correspondent.)

The much advertised difficulty at the Red Dog and Goodwin gravel mines at You Bet, in Nevada county, has stirred up considerable ill feeling throughout this entire section of country. The Anti-Debris Association, or to be more precise, some of its officers, have succeeded in making themselves quite obnoxious, and the result of their work forebodes serious consequences unless the prudent measures sought to be pursued by wiser counsel should succeed in its honest efforts to adjust the difficulty.

A committee of five gentlemen from the Sacramento Chamber of Commerce met a like committee from the Board of Trade of Nevada City to visit and examine the operations and methods at the above named properties. Mr. S. K. Thornton, vice-president of the State Miners' Association, who happened to be in Nevada City on business connected with the Association, and a representative of the MINING AND SCIENTIFIC PRESS temporarily here, were invited to accompany the committees. Arriving at the mine the committees found that a "spy" had already preceded them and endeavored to serve injunction papers issued from the Superior Court of Sacramento county, but failed because of his inability to find the owners of the properties. Had his efforts not been futile his work would have precluded the possibility of affording the committees an opportunity of carrying out the purpose of their visit.

The facts of this case can be briefly stated. These people at You Bet have for three years operated in these claims by the sluicing process. Their blasts generally were in short drifts of from 10 to 15 feet and 8 to 10 feet crosscuts. The amount of powder used was from ten to fifteen kegs (twenty-five pounds each), and not 3000 pounds as charged. There was no evidence of monitors now or in the past.

In addition to this it may be stated that their work would naturally be a matter to come under the supervision of the U. S. Debris Commission, whose agent is almost constantly in the neighborhood.

The waters from the mine flow through a river bed filled with tailings from the upper hydraulic works which had been accumulated previous to the Sawyer decision, and during the rains and present dissolving snows in the mountains these tailings are naturally carried along and serve to a large extent to increase the limited debris from the present ground sluicings in the mine. And yet, in spite of all the interference of these natural elements, the law-abiding miner is prohibited from pursuing his vocation. The writer heard the agent of the anti-debris people acknowledge that he had never been refused admission to the mine, whether at night or in the day, and that he had always been the recipient of courteous treatment.

In giving this unbiased and truthful statement of facts the writer desires to add that the several owners declared to the committees their constant observance of the law in their case, and that their work was always open to inspection to officers of the law and to interested people. These gentlemen command the respect of the community throughout the county, and their frank and honest countenances stamp upon them the character of honor and uprightness.

This last measure of persecution should be speedily visited by an adjustment due a law-abiding body of men, and the proper reparation should be made on the part of a few who, like pariahs, seek to thrive by imposing upon valley people's credulity. Neither the mountain people nor the valley folks can stop the springtime melting of the winter snows, nor the flow of the waters from never-failing springs adown the hillside, carrying with them the detritus in their pathway. Adding this to the sluicing of gravels, but bearing in mind the long and winding way through which they travel before reaching the valleys, the careful observer will find the waters presented in an original condition of clearness and fitness for culinary and drinking purposes, despite the efforts of a few who cling to a losing cause that would live only to bring business stagnation in its possible success. J. F. L.

Nevada City, May 17, '97.

Silver With the Gold.

The complaint against the Mint statistican, Charles G. Yale, as made by the *Chronicle* and other journals of the State, for not recording a heavier percentage of silver with the yearly product of the precious metals of California, may have a very good effect, even if it does redound on the millman and lighten into correctness the work of the Mint statistician. The controversy will do good by way of awakening the gold miners of California to the fact, which for years I have been trying to impress on their minds, that in working the free gold milling system, composed of stamps, silver plates and concentrators, that too large a percentage of silver is lost. It is a well settled fact in the minds of investigators that the average value of silver does not reach to exceed 10 per cent, and yet there are many mines that will run from 15 to 30 per cent, but we do not get it by a long shot—not 25 per cent of it.

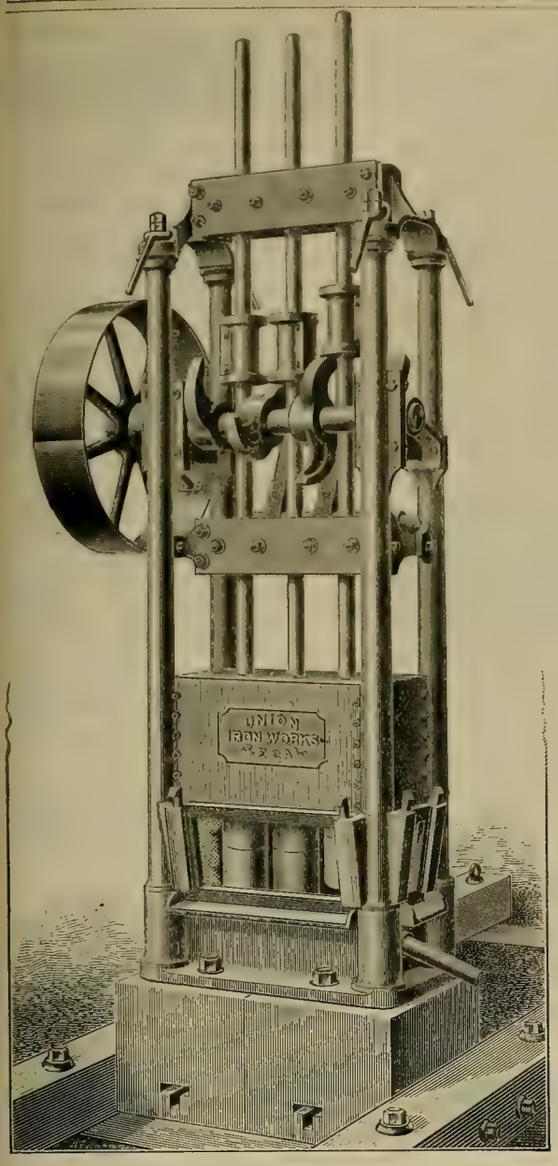
We will now do some figuring on this basis and see the result: Mr. Yale gives the total yield of gold for California at $17,181,582. Ten per cent of this amount would be $1,718,158.20, and 25 per cent of this amount saved will be $429,538.50. Mr. Yale gives as his estimate $422,453.60, and I think his figures are as near correct as it is possible to have them. It must be remembered that there are various chlorination works in various parts of the State, working sulphurets, not one of which, as far as I know, first extract the silver contained therein prior to chlorination. Consequently, all the silver is lost. Now for the question of silver in our California gold mines. Some twenty-five years ago the question was agitated as to the average percentage of silver in the gold mines of California, and from data gathered carefully to settle this point the following table was made up from the many assays of ores from the various parts of the State, which table was compiled, I believe, by Prof. Henry G. Hanks:

Gold. Per Cent.	*Fineness.*	*Silver. Per Cent.*	*Fineness.*
75.86	758.6	20.67	206.7
86.57	865.7	12.33	123.3
86.87	868.7	12.33	123.3
88.75	887.5	8.88	088.8
89.10	891.0	10.50	105.0
89.61	896.1	10.05	100.5
90.01	900.1	9.01	090.1
90.33	903.3	6.80	068.0
90.70	907.0	8.88	088.0
90.90	909.0	8.70	087.0
90.96	909.6	9.04	094.4
92.00	920.0	7.00	070.0
92.70	927.0	6.90	069.0
93.53	935.3	6.47	064.7
96.42	964.2	3.50	035.8

This list shows an average of 9.41-100 per cent, taking the entire State. Now, calculating on this basis, and that I am right in estimating the percentage of silver saved, the result then would be $401,946.49, which is $20,317.11 less than Mr. Yale's estimate. These figures prove two points: First, that Mr. Yale's estimate is approximately as correct as it is possible to have it, considering the difficulty the Mint statistician has in getting even the gold product, and, secondly, that not over 25 per cent of the silver contained in the ores is saved. In many of our mills labor is figured down to hardly a fair living rate, and yet silver is allowed to go to waste, and, in some instances, in value more than the whole mill labor bill. Capitalists are satisfied to get 10 per cent yearly on their mining investments, and yet, in some instances, run 5 per cent a month off that might be saved, as well as a given percentage of gold more. There are two important individuals for mining operations—the millman and the assayer. One tells the value of the bullion he gets from a given quantity of ore, and the other can tell you what you don't get. All mills have the former, but too few the latter—the sequel is clear.

ALMARIN B. PAUL.

San Francisco, May 10, 1897.



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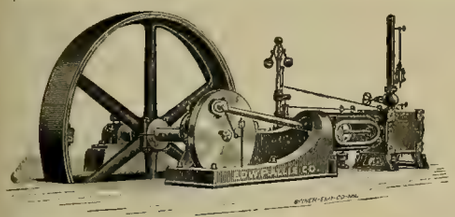
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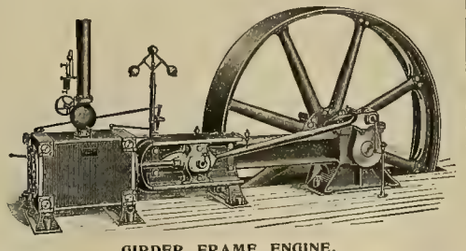
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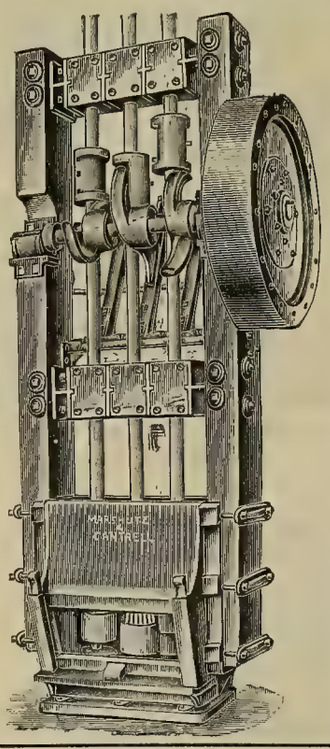
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Saves bill for heavy timbers, millwright and mechanics' labor, and a large amount of space. The term self-contained means a great deal for the mine owner, and can be readily recognized and appreciated in making an estimate for an ordinary plant when the comparative cost is considered.

FIRST: There is saved a large bill for heavy timbers, in many instances obtained at great expense and loss of time.

SECOND: The saving in millwright and mechanics' labor in framing and erecting.

THIRD: The large amount of space saved.

FOURTH: The great saving of freight,

Send for Circulars and Price List.

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Coast Industrial Notes.

—The orange shipments from Riverside, Cal., in April amounted to 121,593 boxes, and a total for the season of 614,890 boxes, or 2157 carloads of 20 tons each.

—Langstaff and Wilson are putting in an electric-light plant at Forest Hill, Cal. In addition to furnishing light, they will have a plant for the manufacture of ice.

—A franchise is being sought in Los Angeles for an electric railroad on San Pedro street to a point beyond the city limits, and it is expected that the road will before long be extended to San Pedro.

—At a meeting of the city trustees of Sonoma, Cal., last week a special election to vote on the question of bonds for the municipal water works was called for June 14th. The sum asked for is $22,600.

—An electric line is to be built connecting the Garlick power plant at Copley, Cal., with the National mine and mill at Old Diggings, three and a half miles, being the third mining plant in that district to be run by electric power from Copley, ten miles from Redding.

—It is estimated that there are now growing in Orange county over 7000 acres of sugar beets, and the indications are that in a few years this large acreage will be materially increased. The Chino factory has contracts for 4000 acres and the new Alamitos factory has about 3500 acres.

—W. A. Clark, who is building the Los Alamitos sugar refinery, in southern California, is in Paris, and a letter from there states that he has purchased a tract of 31,000 acres for a coffee plantation from President Diaz, in Mexico, near Vera Cruz, and will establish a line of steamers and form a colony down there.

—C. W. Leighton of Chicago has leased several thousand acres of land near Tampico, Mexico, for American capitalists, who will put the entire tract in sugar beets. They will establish a beet sugar factory near there. They claim that with the cheap labor of Mexico and the richness of the land they can make big profits in their enterprise.

—Senor Romero, Mexican minister at Washington, publishes an estimate of the money circulation of Mexico, in which he states that the five authorized banks of emission in the republic have issued $40,000,000 in notes, of which $36,000,000 are guaranteed by credits in possession of the banks. Then the banks have also in possession $45,000,000. With that there is in circulation about $106,000,000, or $8.35 per capita.

—By June 1st, as at present arranged, a line of steamers will be in operation between Oakland, Cal., and Sacramento river points, running to within twenty miles of the State capital. Negotiations are also pending for the establishment of a line to operate on the San Joaquin river. Docking privileges will be established at the foot of Alice street. Warehouses will be constructed and connection made with the Southern Pacific tracks on First street.

—The latest census taken by the Mexican Government showed a population of 12,570,000, an increase since the last census, seventeen years previous, of 2,663,000, or 26 per cent. With the introduction of modern methods, the better education of the common people, and the better sanitary conditions, insisted upon by the Government, the growth of Mexico would be faster during the next seventeen years and greater progress would be made. The cattle and fruit industries have made rapid strides, and the transportation of oranges over the Mexican Central road has increased 100 per cent every year during the past three years. The mining business is an important factor and to-day some of the largest smelters in the world are located in Mexico. No retaliatory measures are anticipated on the part of the Mexican Government on account of the new tariff, which is unfavorable to Mexico, as to the duties on cattle and hides.

Personal.

HAMILTON SMITH is expected in Butte, Montana, shortly.

C. W. WHITE has been appointed general manager of the coal department of the Anaconda Copper Mining Company at Belt, Montana.

PRINCE PONIATOWSKI, president of the California Exploration Company, has gone to London on business connected with that company and the Sierra Pacific Railway, and will return about the end of June.

IN recognition of the good work done by Prof. A. C. Lawson the Board of Regents of the University of California have created a new chair—that of mineralogy—to which he has been appointed professor. He remains also as associate professor to Dr. Joseph Le Conte in geology.

EX-VICE PRESIDENT STEVENSON and Messrs. Wolcott and Paine, the other two members of the International Bimetallic Commission, sailed from New York for Havre, France, last Saturday. They will first visit Paris, then London, then Berlin, their object being to secure the consent of all the European nations, or as many of them as possible, to the holding of a conference of the nations in regard to an international agreement as to the coinage and ratio of gold and silver.

THE LOS ANGELES MINING BUREAU,
Cor. Temple and New High Sts., Los Angeles.

We have Eastern and foreign correspondents who are seeking good mining properties for investment. This Bureau will examine and place choice mining properties in California, Nevada, Arizona, New and Old Mexico. Critical and accurate tests of ore made. Best references given. For any information, address DR. STEPHEN BOWERS, President; H. C. SIGLER, Secretary.

Recent California Mining Incorporations.

Star of Plumas W. and M. Co., San Francisco: H. G. Greiner, F. H. Rood, W. Gerken, D. Meyer, N. Hansen, F. Mart, W. J. Gleason; capital stock $100,000, subscribed $5600.

Bonus M. Co., San Jose: I. Meyer, J. F. Harlan, E. Knickerbocker, R. D. Fox, V. D. Livingston: capital stock $100,000, subscribed $60,000.

Bessella M. Co., Oakland: S. B. Reynolds, G. H. Torrence, J. A. Sands, D. H. McIntyre, C. W. Getchell: capital stock $500,000, subscribed $450,000.

Glen Olive M. Co., S. F.; W. L. and W. E. Palmer, S. B. and F. B. Peterson, G. T. and W. M. Klink; $500,000, all subscribed.

Santa Gertrudes M. & M. Co., S. F.: G. S. Conroy, N. Selig, J. F. Keamey, G. W. Gagan, G. W. Loehr, L. M. Manzer, F. W. Meyer, G. L. Compo, H. H. Fuller; capital stock, $20,000; subscribed, $45.

Book Notices.

The Statistician and Economist, edition 1897-98, 672 pages, solidily set and full of solid facts, timely data, compact information, condensed knowledge, correct chronology and valuable statistics, up-to-date and conveniently arranged. The book has been issued for many years, and this volume compares favorably with any of its predecessors and is worthy of commendation. Louis P. McCarty is the publisher and proprietor, 814 California St., San Francisco, who will supply the volume. Price, in red cloth, $3.50; in black leather, $4.50.

Recently Declared Mining Dividends.

Swansea, Utah, $5000; payable May 10.

Big Seven M. Co., Niehart, Montana, $6,000; payable May 11.

FOR SALE CHEAP.

First-Class Air Compressor (Steam Driven) and Drill, New.
Also, 3-Ton Capacity Pulverizer.
A. L. FISH, 59-61 FIRST STREET, S. F.

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The four Boilers now in use at the Crown Mills, together with Fronts, Valves, Grate-Bars, etc., are offered for Sale.

Delivery can be made on or about the 1st of May. For further particulars, inquire of

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GOLD QUARTZ MINE fully equipped with all required machinery and water power and reservoirs, situated on 40 acres of mining property in El Dorado county, to be sold at a bargain. Principals only apply to Thos. R. Church, 1016 Franklin St., or A. M. Ebbets, 109 Sacramento St., S. F.

PROPOSALS FOR CANAL.

Sealed proposals will be received at the office of the Southern California Power Company, Redlands, California, until May 15, 1897, for the construction of 3¼ miles of canal, on the north side of Santa Ana river, from the mouth of Bear creek to the mouth of Keller creek, San Bernardino county, California.

The work is mostly through granite rock and consists of tunnels, flumes and trestles. Over two miles of the distance is through tunnels ranging from 100 to 1600 feet in length. There are twenty tunnels in all.

Contractors may bid on the whole or any part of the work. Plans and specifications can be seen at the office of the company, or they will be sent by mail upon application if desired. Satisfactory references must be given by bidders as to their responsibility, and as a guarantee that a contract would be entered into, providing the bid is accepted. The company reserves the right to reject any and all bids.

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WILL HANDLE 3 TONS OF GRAVEL PER HOUR.

Minimum power and water required. Requires but one handling of gravel. By motion of machine water is returned and used over and over again. Light, durable and easily transported. Simple in construction and inexpensive.

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WANTED.

Old Iron Shafting,
5 to 15 in. Diameter.

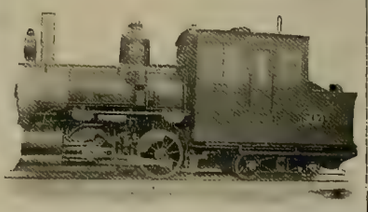
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First-Class Condition—Baldwin Locomotive Works, builders. **Standard** gauge. **Fuel**, hard or soft coal, coke or wood. Weight in working order, about 56,000 lbs. On drivers, about 40,000 lbs. **Cylinders**—single expansion, 13 in. by 16 in. stroke; compound, 9 in. and 15 in. by 16 in. stroke. **Driving wheels**, 42 in. diameter, steel tired. **Driving wheel base**, 5 feet. **Tank capacity**, 750 gallons. **Westinghouse Automatic** air brakes.
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British Columbia.

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Reports on mines, designs and superintends the erection of mining and milling machinery; makes analyses of ores, metals, soils, etc.; arranges for mill tests, and selects suitable processes for the treatment of ores. Correspondence invited. Address W. J. R. COWELL, Victoria, B. C.

British Columbia.

E. S. TOPPING, TRAIL, B. C.,
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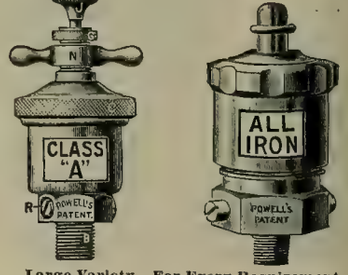
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List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MAY 4, 1897.

581,974.—STOVE—C. M. Allen, S. F.
581,877.—FAUCET—J. H. Beare, S. F.
582,007.—PENCIL CALENDAR—Bradshaw & Wood, Orange, Cal.
581,817.—CARTRIDGE LOADER—E. O. Carvin, Murphys, Cal.
581,977.—LAMP PROTECTOR—Emily A. Clingman, S. F.
582,011.—GAS APPARATUS—A. S. Cooper, Santa Barbara, Cal.
582,117.—LOADING APPARATUS—H. C. Domeyer, Sauvies Island, Or.
581,815.—TELEGRAPHY—C. F. Eaton Jr., Santa Barbara, Cal.
582,118.—CARPET SEWING MACHINE—H. Eschweiler, S. F.
581,857.—VENTILATED HAT—J. E. Goodman, Santa Rosa, Cal.
581,731.—SUCTION BOX—M. D. Keeney, Antioch, Cal.
581,732.—FORMING CYLINDER—M. D. Keeney, Antioch, Cal.
581,733.—SUCTION BOX—M. D. Keeney, Antioch, Cal.
581,886.—GOLD SAVING APPARATUS—J. Marshall, Fairfield, Cal.
581,996.—CULTIVATOR—N. McLean, Watsonville, Cal.
581,940.—BUILDINGS—J. C. Pelton, S. F.
582,084.—BICYCLE HANDLE—P. C. Peterson, Alexander Valley, Cal.
582,101.—RIVET FORM—Natalie Schell, S. F.
581,778.—SASH LOCK—F. Severio, S. F.
582,000.—CURRENT MOTOR—J. J. Smith, Auburn, Cal.
581,836.—GRINDING MACHINE—Emma Taylor, S. F.
27,024.—DESIGN FOR DOUCHE PAN—Haviland & Pratt, S. F.
27,018.—DESIGN FOR MEAT HOLDER—C. P. Loughridge, Nevada, Cal.
27,006.—DESIGN FOR FLAG—C. P. Perkins, S. F.
27,026.—DESIGN FOR CUFF—F. Young, Knights Landing, Cal.
27,027.—DESIGN FOR CUFF—F. Young, Knights Landing, Cal.
27,028.—DESIGN FOR CUFF—F. Young, Knights Landing, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

REVOLVING SPRAY APPARATUS.—G. A. and R. F. Dunn, Dinuba, Cal. No. 581,416. Dated April 27, 1897. This invention relates to an apparatus which is especially designed to travel over the surface of the ground and act as a roller and at the same time to form a traveling receptacle for water, with a means by which pressure can be applied so that the water can be ejected in the form of a spray to be applied to trees or for other purposes. The roller is mounted in a suitable frame so that power may be applied to move it over the ground, and a second smaller wheel or roller is so journaled in the frame that it forms contact with the surface of the roller and is thereby revolved. The shaft of this second roller operates a crank wheel or disk from which power is derived to work a pump, the pump acting to force air into the interior of the cylinder. A discharge pipe leads through one of the journals of the cylinder which is hollow, the inner end of the pipe being located near the bottom of the cylinder so that the liquid contained therein will be forced into the pipe by the pressure of the air, and the outer end of the pipe has a hose connected with it through which the liquid may be discharged with force upon trees or plants when it is desired to spray them to destroy insects, or if plain water is used it may be used to water roads or dampen the surface wherever it is desired.

TOY.—B. E. Henriksen, San Francisco, Cal. No. 581,420. Dated April 27, 1897. The object of this invention is to provide a simple and attractive toy adapted to produce a sound which may be more or less an imitation of the natural voice of the creature in the likeness of which the toy is constructed. It comprises a hollow resonant figure having a vibratable member, a head with a flexible or hinged neck, a lever within the figure hinged at its lower end and extending upwardly into the neck having its free end adapted to bear against the same to throw the head up, a cord attached to the lever at a point above its hinge and passing outwardly through the vibratable member whereby it may be operated to cause the figure to give forth a sound.

PRELIMINARY COOLER FOR ICE MACHINES.—R. F. Schroeder, Sacramento, Cal., assignor of one-fourth to C. W. Hutton, same place. No 581,431. Dated April 27, 1897. This invention is designed to be used in conjunction with ice machines where it is important to save all the labor and time possible, and its operation is to cool the water passing through this preliminary apparatus before it is delivered into the final freezing cans so that it enters these cans at a temperature approximately close to the freezing point. It consists essentially of channels interposed between the water supply and the freezing cans through which the water flows, a pivotal trough having openings in the bottom, said trough being movable so that the openings stand above the channels or may be moved to one side thereof, a mechanism for automatically tilting the trough so that the water flows alternately over the pipes or passages and to one side of them so that the discharge of cold brine upon the channels or passages takes place while the brine is being delivered into the freezing cans, and it is diverted from these passages after the cans are filled and while the water is temporarily not flowing in the passages, the object being to prevent the water in the passages from absolutely freezing when it is not in motion.

APPARATUS FOR REFINING ASPHALTUM.—Arthur F. L. Bell, Carpenteria, Cal., assignor to the Alcatraz Asphalt Co. of San Francisco, Cal. No. 581,451. Dated April 27, 1897. This invention relates to an apparatus for extracting and purifying asphaltum and kindred substances from silicious and other earthy matter by crushing, heating, agitation and the employment of solvents incorporated therewith and the reevaporation of the solvents whereby the asphalt is reduced to a merchantable product. It also relates to devices for collecting and condensing the volatilized products arising from the treatment. It consists essentially of a stationary casing or shell with an interior revoluble drum having end openings and separated from the shell to form a circumscribing space, said drum or cylinder having its inner face provided with means rigid therewith for advancing the material, means for supplying the material to the drum, means for effecting the flow of a solvent through the drum in the opposite direction to the movement of the material, and means for recovering the vaporized solvent. The material is advanced through the drum by a spirally-formed flange rotating therein while heat is applied through the double walls formed by the surrounding space or chamber. The sand, silt and other material is discharged from the drum to a drier and the vaporized solvent is recovered by means of a condenser, suitably connected with the apparatus.

GOLD SAVING DEVICE.—Joseph Mait, Oakland, Cal. No. 581,425. Dated April 27, 1897. This invention relates to an apparatus for separating gold and valuable heavy substances from lighter and worthless material. It consists essentially of an inclined longitudinally oscillating screen and oppositely inclined hopper and a regulating gate through which the material is supplied to the upper end of the screen, an extension or guide between the discharge and the screen, an air chamber supported below the screen having inlet openings in the sides and an open discharge covering the lower surface of the screen, fans with oppositely inclined blades journaled to rotate within the openings so as to force air in from opposite sides, and riffles fixed upon the screen surface having short upturned lower edges with the longest incline directed upwardly along the screen.

STOVE.—Charles M. Allen, San Francisco, Cal. No. 581,974. Dated May 4, 1897. This invention relates to improvements in stoves and is especially adapted to stoves or ranges employed for cooking purposes. It consists of a separable movable top, a means for operating it so that by sliding the movable portion backward the fuel compartment is exposed and fuel may be introduced thereinto without removing the utensils from that portion of the stove. The operation is effected by racks and pinions engaging the racks and turnable so as to move them and the movable part to which they are attached. There is also a device consisting of a flattened portion of the rollers upon which the top is carried, which flattened portion arrives beneath the rollers just as the top is closed, and thus allows it to drop a little and prevents it from being moved accidentally.

SULKY CULTIVATOR.—Neil McLean, Watsonville, Cal. No. 581,996. Dated May 4, 1897. This invention relates to improvements in that class of apparatus known as sulky plows or cultivators. It consists essentially of a wheel axle having the outer ends and the central portion in the same axial line, the bearing wheel being turnable upon the outer ends of the shaft and the seat and beam portion being connected with the central portion of the shaft, which is turnable in a journal box, while the plows or cultivators are raised or depressed by links connecting them with the intermediate crank portions of the shaft with a suitable operating lever for the purpose. This construction allows the plows or cultivator teeth to be raised or depressed without lifting any portion of the beam or the rider's weight, and makes the operation very simple and easy.

SUBMERGED CURRENT MOTOR.—John J. Smith, Auburn, Cal. No. 582,000. Dated May 4, 1897. This invention relates to an apparatus for applying the power of a current of water flowing in a ditch, sluice or other waterway. It consists essentially of a plurality of parallel shafts journaled upon a frame with their axes in the line of movement of the current in which the frame is immersed, gears upon the ends of the shafts and intermediate gears by which the various shafts are connected and propeller blades fixed upon the shafts so that the passage of the water rotates these blades in their shafts and motion is transmitted to the main driving shaft. A clutch mechanism allows any one or more of the shafts to be disengaged by the use of an interior independent shaft revoluble within the shafts which carry the propeller.

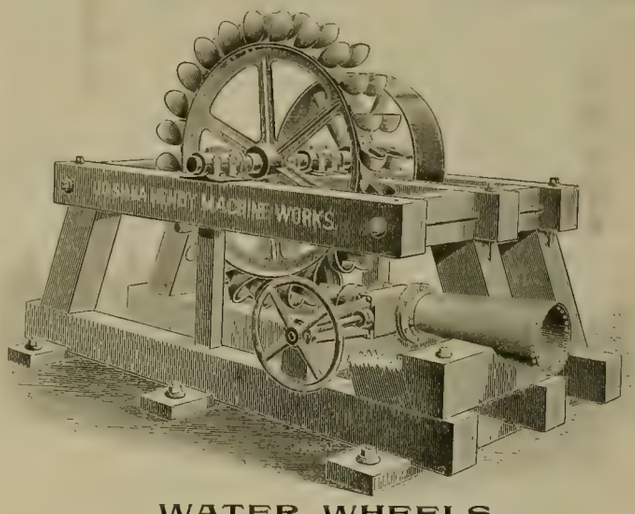
LAMP OVERFLOW PROTECTOR.—Emily A. Clingman, San Francisco, Cal. No. 581,997. Dated May 4, 1897. This invention is designed to prevent the overflow and soiling of lamps while they are being filled. It consists essentially of a flexible removable disk having a central opening to fit around the filling nozzle of the lamp, this disk being provided with upturned peripheral and interior flanges so that when fitted around the filling nozzle it will catch and retain any overflow and prevent its soiling the lamp or other parts.

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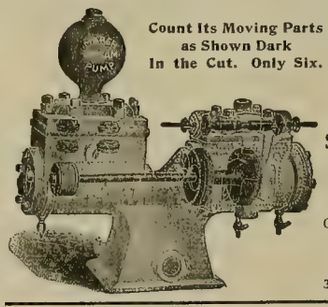
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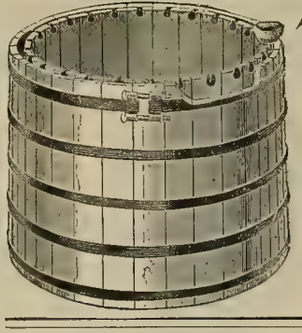
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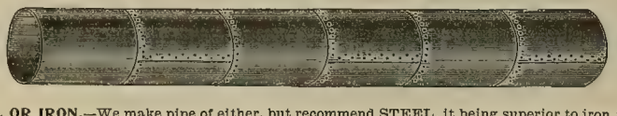
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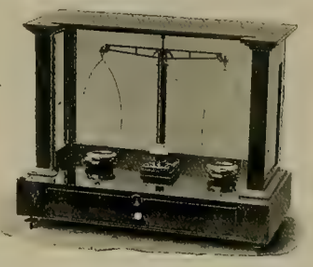


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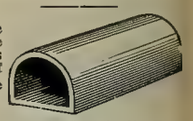


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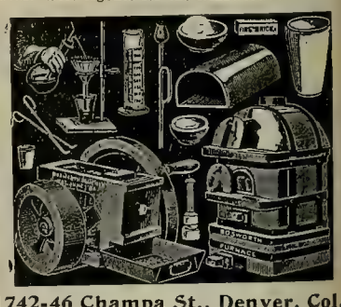


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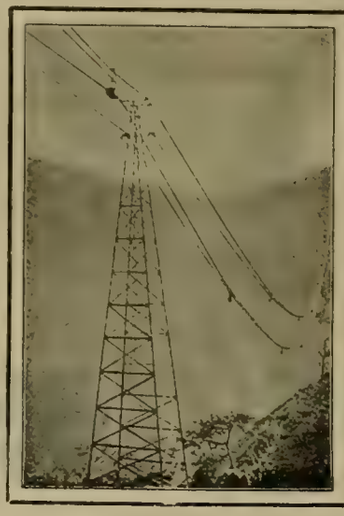
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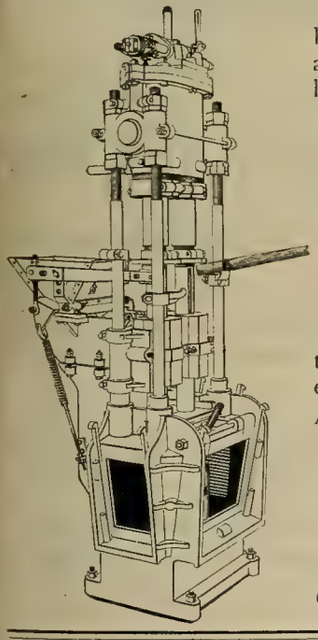
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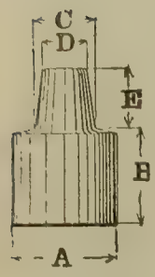
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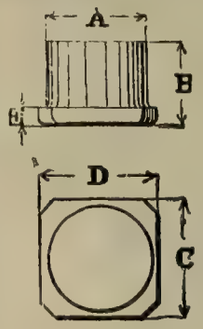
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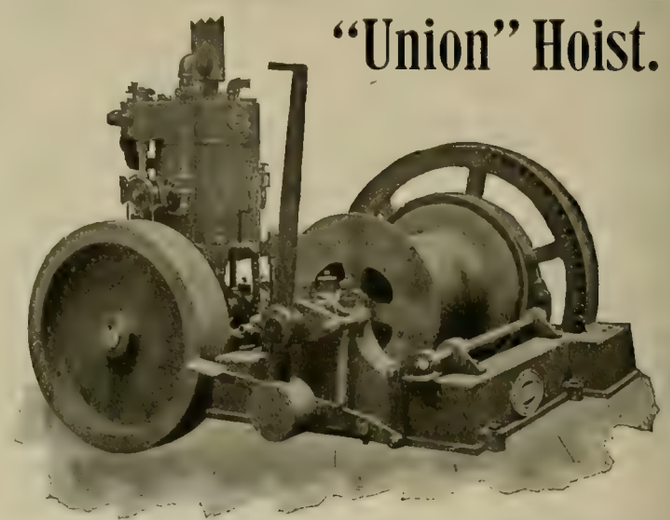
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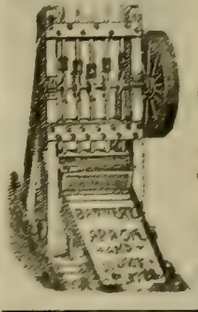
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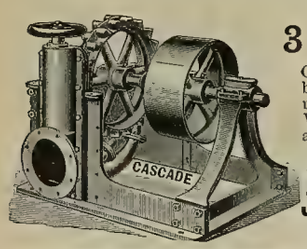
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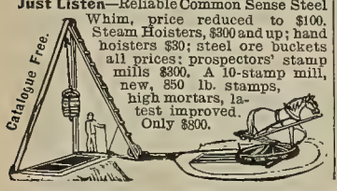
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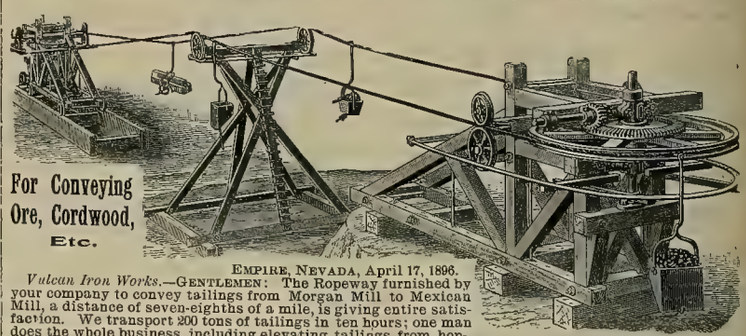
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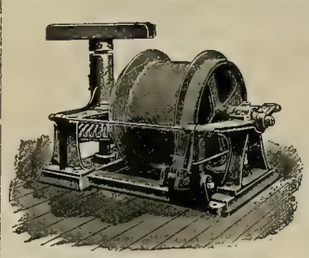
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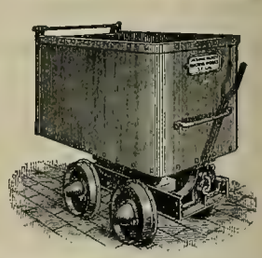
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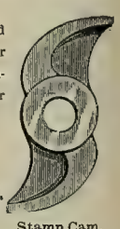


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LIGHT STEEL RAIL.

The Mine and Smelter Supply Co., Denver, Colo.

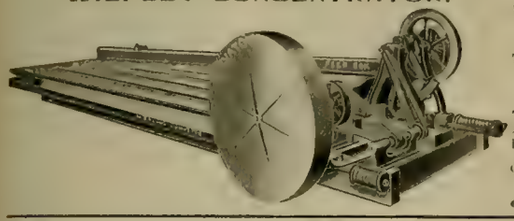
THE LARGEST STOCK OF MINING, MILLING AND SMELTING MACHINERY WEST OF CHICAGO.

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And claim for it BETTER work than any Concentrator made, with a capacity of from 15 to 25 tons per day of 24 hours. It is simplicity itself. No moving belts or intricate parts. Any one can learn to operate in an hour.

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For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Colo; Mary Murphy Mine, St. Elmo, Colo. W. E. Renshaw, Mayflower Mill, Idaho Springs, Colo; H. E. Woods, Denver, Colo.

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ASPEN, COLORADO, April 8, 1897.

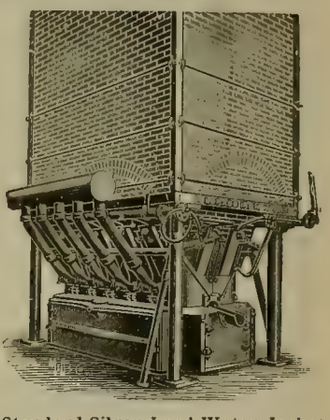
The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Your favor of the 5th inst. at hand and noted. In regard to the Wilfley Table I wish to say that I consider it to be the best device in use to-day for concentrating fine ores; that it will save everything that a gold pan will; that it combines the clean saving of a Rittinger with the capacity of a buddle. I think that without question it will supplant in time all other devices for handling fine and slimy ores. This includes all the vanning machines and buddles. This is higher praise than I am in the habit of giving, but I feel sure that it is deserved, and you may make any use of this that you desire. Yours very truly, [SIGNED], S. I. HALLETT.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

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Standard Silver-Lead Water Jacket Smelting Furnace.

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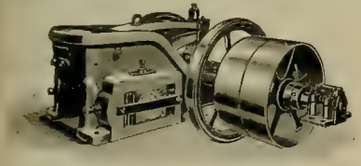
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Market Reports.

The Markets.

SAN FRANCISCO, May 13, 1897.

General business continues fair for the season, although it is not up to expectations owing to bad crop reports. That the yield of wheat will not be a full crop is acknowledged by all, but that it will fall below last year's is not conceded by usually well informed parties. Higher average prices for the cereal will offset the falling off in the outturn, and will make returns in money considerably larger than in last year's crop. The fruit crop will fall below estimates four weeks ago yet there is not a variety but will show an increase over last year by reason of more trees and vines coming into bearing and the general average to the older plant being larger. Prices that will be realized for the canned and dried product will be governed by the apple crop at the East, and for the green fruit by the consumptive capacity of the masses, and the latter will be controlled by their purchasing power. The continued tinkering of the tariff by Congress is having a bad effect for many lines of goods which showed an advancing tendency and are either halting or else lower. In metals and chemicals there are very few changes.

The local money market is reported fairly easy, with accommodations easily obtained by parties good to gilt edge security. Regarding collections, there are conflicting reports. While money jobbers report good collections, there are an equal number who say they are poor; but they all concur in saying there are fewer outstanding accounts, with the very large proportion considered good, while the others may require a long time to work out. The mines continue to send in increasing quantities of gold and less silver. Well-informed sources estimate the yield on this coast at fully 20 per cent more this year than was last year's. In this State the output of the mines is placed at about 15 per cent more, while some place it as high as 25 per cent greater. This increase is based on more mines being worked in about all parts of the State, while the older mines do not show any falling off. Remittances to the East are free for the season, causing stiff rates for exchange. The East reports a plethora of funds, with spasmodic speculation in railroad and industrial securities. Sterlings are weak at New York, but, notwithstanding this, gold is going to Europe. The high premiums ruling in Europe for the yellow metal make shipments profitable. The European money markets are about the same as reported last week. The market is governed largely by war news—when it looks peace speculation shows a revival and money comes out, but when it looks like continued war, then speculation is slow and money does not offer so freely.

New York Silver Prices.

NEW YORK, May 13.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	27 13-16	60¼
Saturday	27¾	60⅝
Monday	27 11-16	60¼
Tuesday	27 11-16	60⅜
Wednesday	27¾	60½
Thursday	27⅞	60¾

	Copper.	Lead.	Iron.	Tin.
Fri.	10 75 @11	3 25	10 00@12 50	13 25
Sat.	10 75 @11	3 30	10 00@12 50	13 30
Mon.	10 75 @11	3 30	10 00@12 50	13 30
Tue.	10 75 @11	3 32½	10 00@12 50	13 25
Wed.	10 75 @11	3 32½	10 00@12 50	13 25
Thur.	10 75 @11	3 30	10 00@12 50	13 30

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	12½c Prem
New York Telegraphic Transfer	15c Prem
London Bankers' 60 days	$4.87
London Merchants	$4.83
London Sight Bankers	$4.88½
Refined Silver, peroz., 1000 fine	60½
Mexican Dollars	49@50

SILVER.—The market fell the past week to 60¼ cents and then advanced to 60½ cents, closing barely steady at that figure to-day. The demand is slow with us, as it is at the East. The export movements from New York are light. The smaller shipments are due to the inactive demand abroad. It is the consensus of opinion that the markets will not show much improvement until the financial situation improves in India, and there is a general revival of business in that country and China.

MEXICAN DOLLARS.—The movement is still slow. New York advices quote sales at from 48 to 49 cents, with reports as low as 47½ cents.

QUICKSILVER.—The market is steady to firm at quotations. The demand shows a slight increase over the corresponding time last year. Our market is quoted at $40.50 for domestic consumption.

COPPER.—The market is lower again, and that, too, in the face of heavy sales at the East, aggregating as follows: Calumet & Hecla 10,000,000 pounds, Quincy 4,000,000 pounds, and John Stanton has also sold a considerable quantity. The price at which the C. & H. placed their copper is 11 cents, with delivery in May and June. James Lewis & Son of Liverpool write that the apparent consumption of England, France and Germany has increased so far this year at the rate of 37,824 tons per annum. On the other hand, the exports of sheets and yellow metal to India has decreased 3500 tons as compared with the same three months of last year.

TIN—The market is practically unchanged for both pig and plate.

The local market is quoted as follows:

Ingot, jobbing	——@14
Ingot, wholesale	——@13
Sheet copper	——@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17

LEAD—The markets both here and at the East show more strength since the new tariff bill was introduced into the Senate.

Our market is quoted in jobbing lots as follows:

Pig	4 00	@	4 25
Bar	—	@	4 50
Sheet	5 62½	@	6 12½
Pipe	4 87½	@	5 37½

SHOT.—There is a fair jobbing demand.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

POWDER—The market is active at full quotations. The consumption is steatily increasing.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

BORAX—There is nothing new to report.

The market is quoted as follows:

Refined, in carload lots, in barrels	5
Refined, in carload lots in sacks	4¾
Powdered, in car lots	5
Concentrated, "	4½

IRON—Advices from the East state that the markets are unsettled under strong competition. The low prices are causing quite a number of furnaces to blow out.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL—Poor crop prospects makes it quite certain that less foreign will be imported than had been estimated. The market for all kinds is steady.

ANTIMONY. — The market is steady and quiet.

Our market is quoted at 7¼@8¼c in a jobbing way. New York mail advices quote 7¼c for Cookson's, 6⅞@7⅛c for Hallett's and 6⅞@7c for Japanese.

NAILS.—The market is firmer.

Wire, carloads, basis per keg	...
" jobbing, " "	$2 20
Cut, carloads, " "	...
" jobbing, " "	2 10

PLATINUM.—There is a fair demand.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC. — The market is quiet at steady prices.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steadier.

We quote in jobbing lots at 50 cents per pound for ingots.

Chemicals.

The East reports an unsettled market with the tendency to lower figures owing to heavy stocks on spot and to arrive, imported in anticipation of higher duties. The probability that the bill will not become law for sixty days yet, causes a selling by weaker holders.

SPELTER — The market is maintained steady by not forcing sales.

We quote our market in a jobbing way at 5 cents a pound.

BISMUTH.—There is a fair demand.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is steadier.

We quote in a jobbing way at 70 to 75 cents per pound.

BONEASH.—The market is steady.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is firm at 3c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a slow demand at 2½c a pound from stores.

NITRATE OF SODA.—In our market there is nothing new to report.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

SULPHURIC ACID.—The demand is light. We quote in a jobbing way at 1¾c per lb for 66%.

NITRIC ACID.—Our market is reported steady from store at 6½@7c per pound in carboys.

BLUE VITRIOL. — Our market is fairly steady.

We quote in a jobbing way at 4½c per pound.

Mining Share Market.

SAN FRANCISCO, May 13, 1897.

The market has been spasmodically active with Con. Virginia the leader. Prices shrank steadily up to Tuesday, when Con. Virginia sold on the regular morning call at $1.80; but in the informal the shares were in demand on an order from Virginia City, said to have been sent through the manipulator's instruction from this city to that place so as to give outsiders the impression that it was outside buying. These purchases advanced the shares to $2.25 by the afternoon of that day. Wednesday morning the market opened strong with sales of Con. Virginia at $2.35, but it began to ease off as soon as the smaller shorts had filled and some realizing was noticeable. The entire list moved in sympathy with Con. Virginia with the heaviest decline on the down grade in Chollar by reason of an assessment, but on the upmove the shares in the north end group of mines showed the most strength. The advance in Con. Virginia is said to have been on a reported improvement in the workings above the 1650-foot level. It is believed that before thirty days pass there will be more improvements reported in this mine. The rapid decline in Chollar was engineered by levying an assessment of 15 cents after assurances had been made that there was enough ore taken out from the Brunswick lode to pay all expenses, and, if properly managed, leave a balance. It is hardly necessary to state that C. E. Elliott is secretary of the company. The impression seems to be quite general that the mine affairs of the company are not properly handled in the interest of outside shareholders. No doubt exists but this belief is founded to some extent on the way in which money has been paid in connection with the Chollar-Norcross-Savage Shaft Co.'s combination shaft on the Comstock lode. It is stated that this shaft has been closed down for years, and that a lone watchman has performed all the duties required for the period of inaction. Regardless of that fact and of the hard times on the lode, Secretary Elliott has rendered his regular monthly statement of pay roll, $200 or $300 a month, and a water bill for the Virginia and Gold Hill Water Company of $75 per month and not a drop so far as known, of water has been used in ten years. It is hardly necessary to state that it is said secretary Elliott figures in this pay roll of $200 or $300 a month.

The Hale & Norcross Company very commendably refused to pay its proportion of these unnecessary expenses in these hard times, and as a consequence it is stated that the management of this company is to be done by those interested in the Chollar proposition, notwithstanding the H. & N. Co. agree to pay their proportion of the watchman's salary. This is said to be only one of the many ways for spending money by which assessments can be levied oftener. It is no wonder that so much difficulty is met in trying to make a deal, for outsiders, when such conditions obtain, will know that if they buy the shares on an advance it is tail they lose and heads the other fellows win. It is surprising that the honest members of the two mining share exchanges do not rise to the occasion and insist on a change in the interest of shareholders, or else refuse longer to call the shares. This action would inspire confidence, and be instrumental in bringing in a class of dealers who could buy and sell at much higher figures, thus insuring active trading and brokers making money and not losing, as they have for some time past.

The following mining companies had cash on hand May 1:

Alpha Con., $3032; Andes, $6335; Alta, $1777; Belcher, $3908; Best & Belcher, $10,479; Bullion, $2645; Con. Cal. & Va., $9861; Challenge Con, $130; Con. Imperial, $3824; Con. New York, $3; Crown Point, $11,638; Caledonia, $2168; Confidence, $5899; Exchequer, $2005; Gould & Curry, $2350; Hale & Norcross, $2156; Julia Con., $735; Mexican, $11,673; Ophir, $9837; Overman, $1992; Potosi, $16,052; Sierra Nevada, $13,262; Standard Con., $25,715; Syndicate, $858; Union Con., $2294; Utah Con., $1229.

The following mining companies had an indebtedness May 1: Cholar, $10,000, with April expenses unpaid, less $91.26 cash on hand and bullion in transit; Lady Washington, $1460; Segregated Belcher, $1800, less $524 cash on hand; Savage, $7600, less $35 cash on hand; Silver King of Arizona, $2254. The April expenses of the Savage mine are paid.

From the Comstock mines our advices are practically unchanged since last week's review. Very little information is allowed to leak. Talk about the espionage of the press in Russia and other despotic countries, it is nothing to compare with the way of manufacturing, cutting off or enlarging news, as desired, regarding work in the Comstock mines, so that the only things that can be depended on in the official letter which, unless an object is sought, are as bare of meat as a well-picked bone. It is needless to say that in these cases the inside gets the meat of the news while the outside gets the bones—number of feet run, directions, and sometimes the level or levels on which the work is done. From Con. Virginia come to hand reports of another small strike in the workings in the upraise from the 1650-foot level. It is the belief with many on the outside that quite a body of ore is in sight on that level, and that much higher prices will rule, on merit, for the shares, but from all that we can learn not

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.	Secretary.
Brunswick Con G M Co, Cal.	11	3c	Mar 22	Apr 23..May 15	J Stadfeld
Bullion M Co, Nev	50	10c	May 4	June 8..June 28	R R Grayson, 331 Pine
Challenge Con M Co, Nev	23	10c	May 13	June 16..July 8	C L McCoy, Mills Bldg
Channel Bend M Co, Cal	7	2c	Mar 22	Apr 24..May 17	J P Langborne, 39 Sutter
Chollar M Co, Nevada	43	15c	May 10	June 15..July 8	C E Elliott, 309 Montgomery
Crown Point G & S M Co, Nev.	70	20c	Mar 24	Apr 28..May 19	James Newlands, Mills Building
Eureka Con D M Co, Cal	8	5c	Apr 2	May 15..June 5	D M Kent, 330 Pine
Golden State M Co, Idaho	1	1¾c	Mar 29	May 1..May 17	E Logan, 101 Van Ness
Gould & Curry S M Co, Nev.	81	20c	Apr 29	June 1..June 22	Alfred K Durbrow, 309 Montgomery
Gray Eagle M Co, Cal	46	5c	Mar 30	May 8..May 29	W J Gurnett, 308 Pine
Jamison M Co	9	5c	Nov 27	Apr 24..June 19	Sam W Cheyney, 120 Sutter
Marguerite G M & M Co, Cal.	6	10c	Apr 12	May 24..June 21	F Mettmann, 237 Twelfth
Occidental Con M Co, Nev	27	10c	May 11	June 12..July 1	Alfred K Durbrow, 309 Montgomery
Overman S M Co, Nev	77	10c	Apr 12	May 17..June 7	Geo D Edwards, 414 California
Savage M Co, Nev	92	20c	Apr 13	May 17..June 7	E B Holmes, 309 Montgomery
Seg Belcher & Mides Con M Co, Nev	19	5c	Apr 6	May 10..May 29	E B Holmes, 309 Montgomery
Sulphur Bank Q M Co, Cal	5	25c	Mar 23	May 3..June 3	T Wintringham, 306 California
Tenabo M & M Co., Nev	1	50c	Mar 29	May 4..May 24	T J Read, 606 Sutter
Thorpe M Co, Cal	6	2½c	Apr 14	May 22..June 13	A F Frey, Phelan Building
Union Con S M Co, Nev	54	20c	Apr 7	May 11..June 1	A P Swain, 309 Montgomery

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much ore will be shown up, or, at least, not enough to send the shares up to figures which would cause the mine to sell on the basis of $1,500,000. This, on a business proposition, is a very big figure for a mine now-a-days, unless it is a large producer or a prospective producer of gold. The work on the 1000-foot and 1550-foot levels does not excite attention, yet some quite important dead work is being done to further purposes. There were extracted last week 52 tons of ore assaying over $130 to the ton.

In Ophir work is still confined to the Central tunnel and 1020-foot levels. On the former level 4 inches of ore has been found from which one ton of ore was extracted assaying $90. They followed the streak north. On the 1000-foot level the crossdrift is to the west. In Mexican they are running a southwesterly drift on the 1000-foot level. They pass through porphyry, seams of clay and narrow streaks of quartz. Elliott is secretary of this mine, as he is of Sierra Nevada. In this latter mine they are still fooling around on the Layton tunnel level. In Union the work heretofore reported is unchanged. The material does not show any essential change. In Andes they are still at work on the 175-foot level. In Utah they are crossdrifting east on the old west surface tunnel. Best & Belcher and Gould & Curry confine their work to the joint east crossdrift on the 800-foot level of the Bonner shaft. From Savage nothing new comes to head. In Hale & Norcross work is west and south from the tenth floor above the 900-foot level. No work is reported in Chollar, but in Potosi they are at work on the 175-foot level. They manage not to report much ore. Elliott is secretary of this mine, as he is of Alpha, in which mine so much reported fooling work has been done and is still being done on the 500-foot level. In Bullion the work is confined to the north drift heretofore reported. Slow progress is being made in the joint west crossdrift that is being run by Con. Imperial, Challenge and Confidence. Nothing,, so far as the public is advised, has been struck yet. In Confidence they are still working on the upper level. No ore was extracted last week. The joint west crossdrift of Yellow Jacket, Kentuck and Crown Point is being driven ahead. The work in Crown Point, Belcher, Seg. Belcher, Overman, Caledonia and Alta, so far as the official letter goes, is of the same character as heretofore reported. Some ore is being raised by Belcher, Seg. Belcher and Overman. The letters from two former fail to state from what level the ore is extracted.

From the Brunswick lode the official letters do not report any material change from any of the mines. Chollar's letter reports that 208 tons of ore were extracted, ra'sed and milled which assayed to the ton $22.94 in gold 16.81 ounces in silver. The April cleanup of the mill yielded $18,447.55 of which $9,433.63 was gold. The only change in the work since our last issue is the starting of west crossdrift No. 1 on the 300-foot level and stopping No. 2 crossdrift on the 500-foot level. The work in Occidental is on the same levels and in the same directions published last week. The joint work of Con. Virginia, Best & Belcher and Gould & Curry is unchanged.

The following resolution was passed this morning by the board of trustees of the Hale and Norcross:

WHEREAS, Information has been received by members of this board of trustees that the seal of this corporation has been forged and counterfeited by certain persons, and that said persons have collected moneys from stockholders of this corporation as assessments of its stock without authority of law; now, therefore, be it

Resolved, That the president of this company be, and he is, hereby authorized and directed to present this matter to the grand jury of the city and county for their action, to the end that said parties may be punished for their unlawful acts.

The following illustrates the changes of the week:

MINES.	May 6.	May 13.
Alpha	.....	.....
Alta Consolidated	.....	.....
Andes	$ 24	$ 23
Belcher	.....	25
Best & Belcher	64	58
Bodie	.....	.....
Bullion	.....	25
Challenge	.....	70
Chollar	83	.....
Confidence	1 30	.....
Consolidated California and Virginia	2 15	1 90
Consolidated New York	.....	.....
Crown Point	.....	27
Exchequer	.....	.....
Gould & Curry	31	23
Hale & Norcross	.....	.....
Justice	.....	.....
Mexican	43	.....
Ophir	1 05	95
Overman	06	15
Potosi	52	49
Savage	21	12
Sierra Nevada	52	.....
Union	30	38
Utah	.....	.....
Yellow Jacket	31	27

San Francisco Stock Board Sales.

SAN FRANCISCO, May 13, 1897.

9:30 A. M. SESSION.

550 Andes	23	1000 Ophir	95
700 Best & Belcher	58	400 Overman	15
100 Caledonia	12	900 Savage	12
200 Challenge	25	100 Seg Belcher	09
400 Chollar	83	100 Union	38
650 Con Cal & Va	1 90	100 Yellow Jacket	26
100 Gould & Curry	23		

SECOND SESSION—2:30 P. M.

200 Gould & Curry	22	1100 Yellow Jacket	27
350 Con Cal & Va	1 85	500 Belcher	25
400 Savage	13	300 Overman	14
100 Chollar	70	200 Caledonia	10
400 Potosi	49	100 Challenge	25
300 Crown Point	27		

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Rainfall and Temperature.

The following data for the week ending 5 A. M., May 12, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week	Total Seasonal Rainfall to Date	Total Seasonal Rainfall Last Year to Same Date	Average Seasonal Rainfall to Date	Minimum Temperature for the Week	Maximum Temperature for the Week
Eureka	.30	49.46	50.41	43.31	40	70
Red Bluff	.00	24.10	21.68	24.91	48	94
Sacramento	.00	16.98	22.67	20.23	86	45
San Francisco	T	22.61	20.84	23.33	49	81
Fresno	.00	10.53	8.16	7.55	48	94
San Luis Obispo	.00	20.70	17.64	....	44	90
Los Angeles	.04	16.80	9.35	19.54	48	76
San Diego	.02	11.67	5.92	10.29	52	66
Yuma	T	5.35	.88	2.96	58	98



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THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from the Industrial Gold Mining Co., in the Old French Mine near Indian Diggins, El Dorado Co., to deposit tailings in Cedar Creek; from James Rooks, in the Messerer Mine near Spanish Ranch, Plumas Co., to deposit tailings in Spanish Creek; from the Haskel Rayline Mining Co., in its mine in Mohawk Valley, Sierra Co., to deposit tailings on a flat; and from Costa, Davis & Co., in their mine at Cherokee, Butte Co., to deposit tailings in an old pit; gives notice that a meeting will be held at room 59, Flood Building, San Francisco, Cal., on May 24, 1897, at 1:30 P. M.

Assessment Notices.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 14th day of April, 1897, an assessment (No. 6) of .02½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 44 Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 22d day of May, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 14th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
A. F. FREY, Secretary.
Office—Room 44, Phelan building, San Francisco, California.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9), of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
SAM W. CHEYNEY, Secretary.
Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 26th day of March, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on SATURDAY, the 24th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 19th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of April, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on MONDAY, the 24th day of May, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 19th day of July, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

MARGUERITE GOLD MINING AND MILLING Company.—Location of principal place of business, San Francisco, California; location of works, Auburn, Placer County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 12th day of April, 1897, an assessment (No. 6) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 237 12th street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 24th day of May, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 21st day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
F. METTMANN, Secretary.
Office—237 12th street, San Francisco, California. Office hours from 5 to 6 o'clock P. M. The Secretary will also receive payments from 12 to 5 P. M. at his business office, 225 Sansome street.

GOULD & CURRY SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of April, 1897, an assessment (No. 81) of 20 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 69, Nevada Block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of June, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 22d day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
ALFRED K. DURROW, Secretary.
Office—Room 69, Nevada Block, No. 309 Montgomery street, San Francisco, California.

CHALLENGE CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Gold Hill, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the 13th day of May, 1897, an assessment (No. 23) of Ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, room 35, third floor, Mills building, corner Bush and Montgomery streets, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 16th day of June, 1897, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 8th day of July, 1897, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.
C. L. MCCOY, Secretary.
Office—Room 35, third floor, Mills building, San Francisco, California.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Silver Star Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 11th day of May, 1897, an assessment (No. 27) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

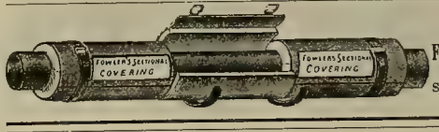
Any stock upon which this assessment shall remain unpaid on the 12th day of June, 1897, will be delinquent, and advertised for sale at public auction, and, unless payment is made before, will be sold on THURSDAY, the 1st day of July, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.
ALFRED K. DURROW, Secretary.
Office—Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

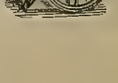
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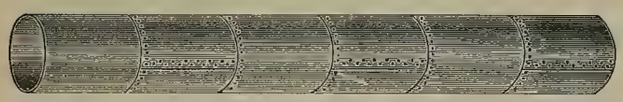
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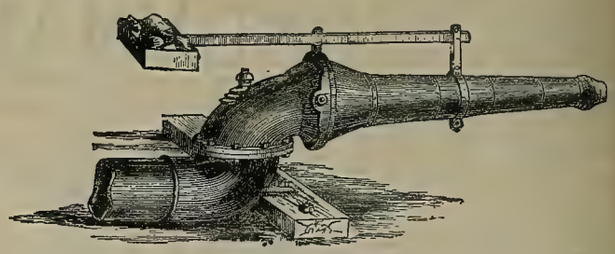
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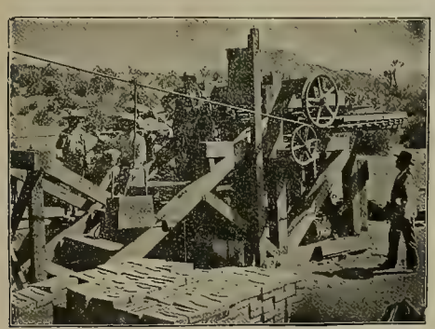
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February 19, 1897.

"Our furnace is now running very nicely indeed, averaging 90 tons per day to 0.10% sulphur, and doing excellent work; in fact, it has improved right along and we are highly pleased with it.

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Catalogue on Application.

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FOR THE CONVENIENCE OF OUR READERS IN THE MINING COUNTIES WE PRINT IN legal size, 12x36 inches, the Mine Bell Signals and Rules provided for in the Voorhies Act passed by the State Legislature and approved March 8, 1893. The law is entitled "An Act to Establish a Uniform System of Mine Bell Signals to Be Used in All Mines Operated in the State of California, for the Protection of Miners." We furnish these Signals and rules, printed on cloth so as to withstand dampness, for 50 cents a copy. MINING AND SCIENTIFIC PRESS, 220 Market St., San Francisco.

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MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 1924.—VOLUME LXXIV. Number 21. SAN FRANCISCO, SATURDAY, MAY 22, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

Southern California Mines.

The southern part of California bids fair to soon attract much more attention from the mining world than it has for many years. The phenomenally rapid growth of the citrus and other agricultural industries during the past decade and a half has done much to prevent the mineral resources of the southern counties from attracting the attention they deserve. It has been for a long time almost impossible for those who believed in the mines south of Tehachapi to turn the attention of any capital for their development from the citrus and similar industries. Probably in the end this will be all the better for the mines, for these pursuits have done much to make mining much easier and less expensive than it was a few years ago. Water has been developed, railroads and wagon roads built, men of means brought into the country, and the mines are now easily accessible, the cost of bringing in supplies no more, and in many cases less, than along the Sierras. Best of all, capital is at hand, ready to take hold.

During the past year there has been more increase in mining, proportionately, than probably in any other part of the State in San Diego and Kern counties. The output of gold and silver of San Diego for 1895 was $344,907 and in 1896 $560,618. In Kern county in 1895 it was $277,497 and in 1896 $625,516. The increase in these two counties was $575,703, or over one-third of the total increase of the State. While there has not been an increase in Riverside and San Bernardino, there has been of late a large amount of development work and mines being opened give promise of large increase this year.

A few years ago there was no part of the State less inviting to the miner, owing to the difficulties in the way of prospecting or working mines, while now all this is changed. In San Diego county, while a large part of it is desert in appearance, the mining districts have been of late years brought within easy and quick communication with the outside markets.



ROYAL ROCK MINE.

The Rand district, in Kern county, will have one railroad, and probably two, within a few weeks. This means much to any mining district. In earlier days attempts have been made to open up mines in some of these same southern counties, when the freight alone on mills and machinery was more than the total cost of purchasing and setting up would amount to now. As a consequence, there were many failures in large undertakings, such as that at Panamint and other places. These often unjustly gave bad names to mines that would now, with cheaper methods, pay well. A mine remote from cheap transportation, opened and condemned twenty years ago, is better worth investigating than any new prospects. Panamint has long been shunned because of its bad name; yet to one familiar with the manner in which money was expended in an attempt to open it there can be no reason for believing that the mines would not now pay, because they did not then under such circumstances.

In the counties of Riverside, San Bernardino, San Diego, Los Angeles and Kern there were, according to the last report of the State Mineralogist, 818 stamps in 1895, many of which were idle. While it is impossible to obtain exactly the number that have been added since, it is safe to presume that there are by this time over 1500 stamps. In many cases the mills which have been erected upon some of the larger properties are only small prospect mills, the forerunners of larger plants.

A great advantage possessed by these southern counties is the presence as residents of men of means and energy—men who have been the cause in large measure of the phenomenal growth of the country in other directions. Soon enough will have been done to prove the value and permanency of the mines and interest these people in their development.

During the past winter good work was done by prospectors in the south and the results are plainly seen in the large amount of development work now going on upon their properties.

The accompanying cuts show three typical large mining plants in the land of the cactus. One is of the Royal Rock mine in San Bernardino county, near Oro Grande, and the others the Good Hope and Santa Rosa of Perris, Riverside county.



SANTA ROSA MINE.



GOOD HOPE MINE.

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TO THE PUBLIC.

No one is authorized to solicit business for this paper unless in possession of proper credentials and regularly numbered and stamped blank subscription receipts.

San Francisco, May 22, 1897.

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THE rapid growth of the mineral water industry in this State is illustrated by the report of the Mining Bureau upon the State's output, which shows that the total value in 1895 was $701,397 and in 1896 $808,843. In 1895 only eight counties in the State reported any yield, while in 1896 returns came from no less than fifteen counties, as follows: Butte, Colusa, Contra Costa, Fresno, Humboldt, Lake, Monterey, Napa, San Benito, San Diego, Santa Barbara, Santa Clara, Solano, Sonoma and Siskiyou.

THE management of the MINING AND SCIENTIFIC PRESS takes this method of disclaiming responsibility for certain remarks in last week's paper, under the heading "Mining Share Market," respecting the affairs of the Chollar Mining Company, in so far as they may be assumed to reflect upon Mr. C. E. Elliott. In the hurry of press day things sometimes get into a newspaper which, if they had been brought to the notice of the management, would not have appeared. Of this sort was the report of the "Mining Share Market" of last week. This disclaimer is an act of free will and does not grow out of any suggestion on the part of Mr. Elliott or anybody else.

The Neighborhood Swindle.

In Montana, near the Mayflower mine at Gaylord, there was a big strike made last Spring. Since then a number of men who have located claims in the neighborhood have been selling them to unsophisticated people in Butte on representations that they adjoined the Mayflower and would become as valuable. One group near the Mayflower, upon which very little work has been done, it is alleged, has been sold and resold many times over. Then it is said that after selling the vendors have gone in and jumped these mines in some instances.

This is an extreme case of a very old game that has been worked in every district in the world, and which is yet finding many victims. In Colorado a bill was presented in the last Legislature to prevent the people who engage in this business from giving to the properties offered names similar to rich mines near which they are located.

This sort of swindle is worked more commonly in the East than here. The prospectus proposed for the unwary will give reports—not so much on the property offered, as upon other properties in the neighborhood which are well known.

Support the Miners' Association.

In the last convention of the California Miners' Association there were represented only twenty-one counties of this State, and in a number of the counties represented there were no local organizations at the time. Yet during 1896 no less that fifty-three of the fifty-six counties in the State produced minerals of one kind or another. From thirty-five of these counties the value of the mineral product of each was valued at over $100,000, and nineteen of them produced over $500,000 worth each. Nine counties produced over $1,000,000 each. The importance, directly, of the mining industry in its different branches to many of the counties is far greater than their individual outputs. These figures show the importance to all the counties of the State of joining in any movement that will tend to foster mining.

Little is asked, or probably ever will be asked, that will be the cause of any increase in taxation. Mining has required less State aid than any other large industry. Yet there is seen every day more need for concerted action by the miners to secure proper legislation, much of which will be for the good of other industries as well as theirs. The time is coming when there will be a pressing need for action to conserve and obtain the best possible use from the waters and timbers of the State. The road question is now in such a position that it is time for all such bodies as the California Miners' Association to take some active interest. There is need for better State laws as to mining and for changes in the Federal laws to meet the changing conditions. Of the need for proper representation of the mining industry in Washington there has been much said.

As long as the California Miners' Association is conducted upon the lines which have been followed in the past it should have the hearty support of the mine owners of the State. Its work has been marked by serious desire to do what can be done for the welfare of the industry. It has never been used as an advertising medium and has always commanded the respect of all.

It is to be hoped that all mine owners throughout the State will join the Miners' Associations of their respective counties and contribute the very small dues required of members. For the amount expended no public or semi-public organization in this State has ever done so much for the public good. The sphere of usefulness of the California Miners' Association is growing as the industry increases in importance. It has done much, and will do more as a body, that the individuals cannot accomplish for themselves.

The New Mining Law.

The new mining law of California as to location of mining claims upon public domain goes into effect next week. Had the miners of the State taken more interest in the proposed legislation last winter the law would probably in some respects have been differently framed. Those who had charge of it did the best that they could under the circumstances and with the short time at their disposal. No better time could have been chosen than the present for a fair test of the value of its provisions. But the value of these tests will, in a large measure, be lost if the miners, especially the Miners' Association, do not take steps in time before the assembling of the next Legislature to prepare well in advance for any remedies or changes they may deem advisable. No general law on the subject affecting so many districts should be passed hastily.

The last Legislature showed its willingness to pass any laws that the miners would agree upon for the welfare of their industry, and there will be no trouble about securing further legislation at the next session. It is peculiarly a province of the Miners' Association, through its legislative committee, to decide in good time what measures will be necessary and present them in proper shape. It would be well for the legislative committee appointed by the last Miners' Convention to prepare and present at the next meeting a report, not so much upon what has been done, but rather what should be done in the future. There are a number of subjects that they might well take up, such as the question of mechanics' lien on mines and the making of mining a public use in order to enable mine owners to obtain rights of way.

Speculative Values of Mines.

The returns from the mines of the Rand, South Africa, show a steady increase from month to month and reports of development work, and the erection of mills to crush ore opened up guarantees a continued increase in the total yield for some time to come. Yet in the London stock market the prices of shares show a continued declining tendency. In Western Australia there is even a greater proportionate increase in the yield and the reports all show that there is certainly a brilliant future for the mines. Yet the price of shares continues to fall in London, and it is almost impossible to float an Australian mine in that market. The output of Cripple Creek is increasing steadily, and proof is being given that the district will hold up its yield better than was believed. Yet the price of shares is falling.

As to Africa and West Australia, it may be explained that too much money was offered by the richest people in the world, and speculators and promoters ran the prices even of the best properties far beyond their real value. The shares will now probably go down to or even below their real value. In the meantime mining will be conducted upon more business-like lines and unhampered by too much capital.

Explaining the case of Cripple Creek, the *Mining Investor* of Colorado Springs says:

Has the production of more gold anything to do with lower prices? Has, in fact, the showing now being made at Cripple Creek anything to do with prices at all? Are fat salaries being paid? If not any of these reasons, what is the cause of the continued decline of mining stocks? In answer to the last question I would say that, more than anything else, it is the condition of the entire country that is affecting mining stocks. What is the news from the Eastern markets? What is the condition of trade in the East? There is but one answer to both: Dull! Is it, then, unreasonable for the mining market to be dull and prices to be low?

Mine Management.

California is, more than any other great mining field in the world, a "poor man's country," and will remain such unless stock gambling on a large scale in local mines comes into vogue. Most of the large mines of California have been opened by men with small capital, or none at all. Most of the mine owners to-day who are wealthy have become so through, while with little or no means, having discovered good properties, which alone, or with little outside help, they have themselves developed.

In no other mining district is such a large proportion of the mines managed by the owners themselves. As a result, California has produced more of the leading miners who have been called to other parts of the world. Yet too many men, who are new to mining, are mismanaging their own properties. In earlier days it was impossible to employ skilled miners, and the proportion of failures was far greater than it is now; yet to-day there are more mines being mismanaged in California, probably, than anywhere else in the world, simply because men of skill are not employed. The mine owners, as a rule, do not pay salaries that will tempt the best miners to enter their services as managers. It is particularly noticeable that foreign investors in mines in California pay more in the way of fees and salaries for skilled managers or experts than do the Californians. Their initial expenses and cost of management are always greater, but before they begin operations they have taken a simple, proper business precaution, often neglected by local investors.

The Trans-Mississippi Congress.

It is to be hoped that California will be well represented in the Trans-Mississippi Congress to be held this year in Salt Lake. The meetings that have been held in the past have done a great deal to unite the West upon questions of common interest, and it is only by concerted action that much can be done in the way of inducing needed Federal legislation. The influence of any single State delegation from west of the Mississippi can do little in Congress. The questions as to arid lands, forest preservation, and the management and sale of public lands are daily becoming more and more important. Unless steps are taken soon to preserve the people's interests in these things great injury may be done.

Concentrates.

THE Rossland, B. C., Mining Stock Exchange members propose to disincorporate.

THE Montreal copper property near Frisco, Utah, is reported sold to Denver people for $200,000.

JAMES DIXON of Vancouver has purchased the Badshot mine near Ferguson, B. C., for $150,000.

A PROSPECTOR in Poor Man's gulch, Calaveras county, California, last week, found a $9000 pocket.

THOMAS MAGUIRE found a $280 nugget in Heybrook gulch, Siskiyou county, California, last week.

IN the Summit district, in Kern county, California, a soap mine is reported to have been discovered.

A RICH strike has been reported in the Alameda mine, in the Rand district, Kern county, California.

A 10-STAMP mill is to be erected on the Lighthouse mine, near Middle Bar, Calaveras county, California.

NEAR Neihart, Mont., are large deposits of gypsum, and a mill has been erected for the manufacture of stucco.

JAMES A. YERINGTON has bonded a mica mine in Lincoln county, Nevada, and samples cut measure 24x24 inches.

THE parties interested in the copper mine in Mason Valley, Nevada, expect to begin the erection of a smelter next week.

AT Custer City, South Dakota, mica deposits have been bonded by a Cincinati syndicate and development work begun.

A STRIKE of copper ore, which carries gold, is reported to have been made recently in Althouse district, southern Oregon.

THERE are over 400 prospectors in the Fort Steele country, British Columbia, following the snow line up into the mountains.

SEVERAL directors of the Le Roi mine have gone to Rossland, B. C., on business connected with building the proposed smelter.

AT Nelson, B. C., last week, the Poorman mine was purchased for $100,000 by Hector McRae and J. F. Ritchie of Rossland.

A LARGE deposit of asbestos has been discovered in the Chihuahua mining district, near Oak Grove, San Diego county, California.

AN 18-inch vein of free-milling ore has been discovered almost in the heart of the city of Deadwood, South Dakota, and several claims have been located.

PITTSBURG, PA., people interested in mines at Idaho Springs, Colorado, have organized a company to drive a tunnel into Albro hill a distance of 3500 feet.

EXPERIMENTS have shown that the large bodies of low-grade gold ores at Bingham, Utah, may be worked at a profit. This will add much to the output of the district.

DURING February and March nearly 300 mining companies, capitalized at over three hundred million dollars, were incorporated and registered in British Columbia.

BRITISH COLUMBIA stocks are coming into demand in Japan. A Rossland company lately sold 5000 shares in that country and are proposing to establish an agency there.

A REPORT comes from the Rapid River district in Idaho that the Irwin ledge, 840 feet wide, with low-grade ore carrying gold and copper, has been bonded by Carr & Parker for $70,000.

NEW YORK capitalists have purchased the Peacock Farm and White Mountain copper properties in the Seven Devils district in Idaho and have incorporated a company with a capital of $2,000,000.

THE Canadian Pacific gave out that it would build the Crow's Nest Pass Railway this season, but is taking no steps in that direction, and the British Columbia papers are complaining of bad faith.

IT is reported that five new smelters will be erected at Keswick, Shasta county, Cal., as rapidly as the work can be done. About 9,000 tons of calcined ore is ready for the smelter at the new roasters.

FOR April the report of the Alaska-Treadwell is as follows: Period since last return, 31 days; bullion shipment, $38,996; ore milled, $20,405 tons; sulphurets treated, 329 tons; of bullion there came from sulphurets $10,459.

THERE has been discovered a deposit of mineral paint on the south fork of the Provo river, about twenty-eight miles from Park City, Utah. It is claimed that the product is equal to any similar deposit and is quite extensive.

THE output of gold from the Bendigo district, Victoria, Australia, from January 1 to March 28—thirteen weeks—was 44,344 ounces, against 41,325 ounces in the same part of 1896. Upon this output dividends amounting to £31,700 were paid.

A PRESS dispatch announces that the extensive San Marcial coal fields in the State of Hermosillo, Mexico, have been purchased by the Southern Pacific Railway. The coal is to be used on their western lines and on Pacific Mail steamships.

ANOTHER strike, and one much larger than that made two weeks ago, is reported in the Gwin mine, in Calaveras county, California. It was made on the 1400-foot level. This and similar reports from deep mines along the Sierras will do much to encourage bolder mining on other properties.

EXPLORATIONS which have been in progress for more than a year in the vicinity of Figeac, France, have, according to the *Echo des Mines*, resulted in the discovery of gold in decomposed diorite, in micaceous schist, and in veins of argentiferous galena, extending for a length of at least eight miles.

LAST week's shipments of ore from Rossland, B. C., amounted to 1240 tons, besides 164 tons milled. The Le Roi shipped 825 tons; War Eagle, 350; and the Iron Mask, 65 tons. The manager of the Le Roi announces that the output from that mine will be doubled in two or three weeks.

AFTER the sale of control of the Helena and Frisco mines at Gem, Idaho, to the Exploration Company in December last, the mill was shut down and since then 100 men have been employed in development work. The mill is being enlarged and will be started up about July 1st with a capacity of 800 tons daily.

IT is reported from Montana that the Bigelow-Lewisohn people are negotiating for control of the Montana Ore Purchasing Company with a view to consolidating it with the Boston & Montana and Butte & Boston Companies. This would make one of the largest copper mining companies in the world.

THE receiver of the Weldon mine at Leadville, Colorado, reported last Monday that the sales of ore by him were $95,-191.91. He had paid out in dividends $68,000, leaving on hand a little over $5,000, which was turned over to the Weldon Company. The business was closed and the receiver discharged.

THE Standard mine, on Canyon creek, in the Coeur d'Alene country, Idaho, according to the *Spokesman-Review* of Spokane, paid $53,000 profits last month, and its profits for the past year have averaged more than $50,000 monthly. It is owned by J. A. Finch and A. B. Campbell of Spokane and capitalists in Youngstown, Ohio.

THE good effect of the revival of mining on business is probably best illustrated by the fact that Spokane, Wash., which depends in large proportion on that industry, shows a much larger increase in the total of bank clearances for the first four months of 1897 over those of 1896 than San Francisco, Denver, Salt Lake, Portland, Los Angeles, Seattle or Tacoma.

THE new California mining law as to locating claims goes into effect at midnight next Tuesday. The provisions requiring that all claims be recorded with the county recorders, and that $50 worth of assessment work must be done within sixty days, are similar to provisions in the new Utah law, and the question as to whether they will hold is to be brought up in the courts.

THE American Institute of Mining Engineers will hold their annual meeting in Michigan in July, at Houghton, some time in the latter part of the month, with excursions to the Vermillion and Mesabi Iron ranges, on the north shore of Lake Superior, and to some of the copper mines near Houghton, on the south shore, the meeting and excursions to occupy about ten days.

CAPTAIN COUCH, the general manager of the Merced Gold Mining Company of Mariposa county, Cal., while in Boston recently advised his friends to hold on to their shares in the company, as, he said, the property was in a splendid condition. The shaft has reached a depth of 1000 feet, with the same results that other properties experienced—coming into good milling ore.

LAST week the Bullion-Beck mill in the Tintic district, Utah, was closed down and about 100 men thrown out of employment. The reason assigned for the closing down of the mill is that the freight rates on ores from Tintic district to Eastern points has been raised $2.50 a ton and smelter charges have advanced. Arrangements are pending to convert the plant into a stamp mill.

IN Utah the fact that the railways have advanced the cost of transportation on ore and bullion, and that the smelters have increased the treatment charges, has given rise to many alarming rumors concerning the policy of the producer, and much uneasiness prevails throughout mining and labor circles. It has been reported that the Mammoth of Tintic and the Mercur would close their mills.

THE Colorado agent of the Illinois Steel Company has been instructed to increase the shipments of manganese ore from Leadville to 150 tons daily. Shipments of this ore from Leadville commenced in February, 1896, the average shipments being 120 tons a day until the strike occurred, when the shipments were cut down to 75 tons daily, which average has been maintained until the present time.

PRESIDENT CHARLES H. FISH issues a statement which shows that the entire yield of the mines composing the present Consolidated California and Virginia Mining Company up to October 1, 1896, was: Gold, $61,780,474.86; silver, $69,856,-832.96; total, $131,637,307.82. The dividends paid were as follows: California, $81,320,000; Con. Virginia, $42,930,000; Con. California and Virginia, $3,898,800; total, $78,148,800.

THE California Debris Commission has received new applications to mine by the hydraulic process from the Industrial Gold Mining Company, in the old French mine, near Indian Diggings, El Dorado county; from James Rooks, in the Messerer mine, near Spanish Ranch, Plumas county; from the Haskel Ravine Mining Company, in Mohawk valley, Sierra county, and from Costa, Davis & Co., in their mine at Cherokee, Butte county.

THE Grant's Pass *Observer* says that it would be difficult to prescribe the limits of the copper belt of southern Oregon and northern California, the center of which is at or near Grant's Pass, though the belt has a width of about sixty-five miles northeast and southwest, and a length of not less than 300 miles, in the limits of which are many outcroppings of copper. At present there are but two properties being worked in this district, and these on small scales.

WESTERN AUSTRALIA exported in March 40,296 ounces of gold. The total for the first three months of 1897 was 113,208 ounces against 45,357 ounces for the first three months of 1896 and 87,858 ounces for the last three months of 1896. While there has been a great improvement in the output and increased confidence in their future, the prices of shares have continued to go down. This means that speculative prices will cease to hold and mining be brought down to a business basis.

IN Montana there is a law providing for the payment of a fee of 50 cents for each $1000 of capital stock on filing articles of incorporation. Last week the Seven Devils Mining Company filed papers for a capitalization of $10,000, which at the rate of 50 cents per $1000 necessitated paying a fee of $5. A day or so later a meeting was called and the capitalization was increased to $1,000,000. The fee for filing such increase of capitalization is but $5. Thus it cost these Seven Devils but $10 to file papers for a $1,000,000 company. This is a saving of $490 to the incorporators.

THE call for the International Gold Convention, to be held in Denver in July, has been received. It is stated that the objects are to secure such national legislation as may be calculated to promote the business interests and development of the resources of the mining industry in North and South America; to bring together mining men and investors; to increase reciprocal trade among them; to discuss such questions as are naturally suggested by its objects; to cultivate acquaintance, fraternal feeling and hearty co-operation among the various mining, commercial and labor bodies represented; and especially to take under advisement the importance of the creation by Congress of a department to be known as the Department of Mines and Mining, thus securing a Cabinet officer who represents an interest which affects more than one-third of the people of the United States.

THE report of the Simmer and Jack mines of the Rand, South Africa, from March 1, to December 31, 1896, shows that the total working expenses were £179,732 6s 10d, divided as follows: Mine expenses, £71,767 17s 10d; hauling and pumping expenses, £9548 0s 9d; transport of quartz, £3331 15s 11d; mill expenses, £26,300 15s 10d; cyanide expenses, £19,547 13s 2d; chlorination expenses, £8419 14s 8d; general charges, £12,976 14s 1d; development, £26,170 10s 4d; maintenance of buildings, £1669 4s 3d. The value of the gold realized was £290,269 16s 7d from 134,055 tons crushed. The cost per ton was £1 6s 10d; yield per ton, £2 3s 4d, and net profit per ton, 16s 6d.

A CONFERENCE committee of the two houses of Congress last Tuesday reached an agreement on the provisions in the Indian Appropriation bill concerning the Uncompahgre Indian reservation in Utah. As it now stands it directs the Secretary of the Interior to at once allot agricultural lands to the Indians now located upon or belonging to the Uncompahgre Indian reservation, said allotments to be upon the Uncompahgre and Uintah reservations or elsewhere; that all the lands of the Uncompahgre reservation not heretofore allotted in severalty to Uncompahgre Utes shall, on and after the first day of April, 1898, be open for location and entry under the allotment laws of the United States.

ENGLISH advices show that while the price of copper has fallen from 12 to 11 cents in the United States, and somewhat less in England, the European consumption continues to increase and absorb large arrivals, so that the stock continues to grow less, as it has since 1892. On the first of May the stock on hand was 28,743 tons, against 50,928 tons may 1, 1892 48,094 tons May 1, 1893, 43,206 tons May 1, 1894, 50,239 tons May 1, 1895, 34,246 tons May 1, 1896. Yet the imports of copper into England have gradually increased. From January 1 to May 1, 1892, the imports were 32,317 tons; in 1893, 32,422 tons; in 1894, 34,441 tons; in 1895, 34,011 tons; in 1896, 40,617 tons, and in 1897, 42,417 tons. The total visible supply on May 1 for the same years, as reported from Liverpool, was 53,668 tons in 1892, 52,055 tons in 1893, 46,805 tons in 1894, 54,638 tons in 1895, 38,459 tons in 1896, and 33,825 tons in 1897.

THE directors of the De Lamar Company of Idaho have passed the dividends for the six months ending March 31st, owing to falling off in product. The following is Manager Huntley's report for March: Number of tons crushed (wet), 4419; number of tons crushed (dry), 3977.10. Average assay value of the pulp: Gold, $15.22; silver, $2.16; total, $17.38. Average assay value of the tailings: Gold, $4.41; silver, $0.57; total, $4.98. Percentage saved, total, 71.35; number of ounces fine gold produced, 1951.037; number of ounces fine silver produced, 15,314.65; value of gold produced (at $20), $39,020.74; value of silver produced (at 65c), $9954.54; estimated surplus on sales of March bullion, $700; ore sales (estimated), $2628; miscellaneous revenue, $124.95; total, $52,428.23; deduct all expenses for the month, $38,678.23; estimated profit for March, $13,750; bullion and ore on hand and in transit, being result of general cleanup for the year, $10,085; total, $23,835.

A BILL for the regulation of joint stock companies which has been adopted by the provincial government of British Columbia provides that for the future all joint stock companies carrying on business in the province will be divided into two kinds—provincial and extra-provincial. The latter—those incorporated outside of the province—are again divided into two classes. One of these will consist of companies organized under the laws of Great Britain and Ireland; of the Dominion of Canada; the old Province of Canada, or of any of the provinces of the Dominion. Such companies can obtain a licence to carry on their business in British Columbia. The second class will comprise companies organized elsewhere, and before they can do business in the province, they must be registered under the act. The bill also contains elaborate provisions for the issue of prospectuses and for other matters, all intended to protect investors, shareholders and creditors. The bill also provides for the voluntary winding-up of companies, for the preventing of fraudulent practices, and other matters.

THE Ferreira and Robinson are the two greatest working mines in the Rand, South Africa, at present. The following are the results from the Ferreira for April: Crushed, 9964 tons; bar gold extracted, 8139 ounces; concentrates caught, 260 tons; assay value of concentrates, 7 ounces 13 dwts. fine gold per ton, equal to 1989 ounces. Cyanide works—Bullion produced from tailings, 2791 ounces. Total gold from all sources, 12,919 ounces. The following figures are from the March report of the Robinson mine: Quartz mined 15,783 tons. Development—Drives, 720 feet; raises, 233 feet; crosscuts, 589 feet; total, 1542 feet. Mill—Stamps at work, 120; net running time, 29½ days; tons crushed, 15,783; tons per diem per stamp, 4.4; gold from mill, 11,018 ounces 8 dwts. Chlorination and cyanide works—Gold won from own concentrates (by chlorination), 1057 ounces; bullion from tailings (cyanide process), 2679 ounces 7 dwts.; bullion from slimes (recovered by Rand Central O. R. Co., Limited), 1615 ounces 9 dwts.; from own ore, 16,388 ounces 4 dwts.; gold from concentrates purchased (by chlorination), 2442 ounces, 1 dwt.; total, 18,830 ounces 5 dwts.

AT a meeting of the Consolidated Gold Fields, Limited, in London to increase the capital to £2,700,000, John Hays Hammond made the following prediction as to mining costs in Africa: Now let me make a prediction, which might be called a bold one, but in the fulfilment of which I am perfectly confident, and let me tell you that costs of deep-level mining will be less—very considerably less—than the costs of mining to-day upon the outcrop companies. The people of the Transvaal, regardless of political differences—for the Boers themselves are beginning to realize their dependence upon the mining industry—the people of all South Africa, the capitalists of not only England, but of the Continent of Europe as well, must co-operate in their endeavors to obtain the best possible economic conditions for the development of the gold mines of the Witwatersrand district. Now, the expansion of the mining industry of the eastern and the western portion of the Rand, and also in the outside districts: that can only be attained by affecting a considerable but quite possible reduction in the costs of mining. To this end, as I have said, all efforts will be directed and, I believe, infallibly with ultimate success.

Practical Notes on Hydraulic Mining.*

NUMBER VII.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE H. EVANS, C.E., M.E., General Manager Cons. G. Mines of Cal., Ld. Oroville, Cal.

Overshot Wheels.—I think I am safe in stating that this class of wheel is more popular than any other class of rough-and-ready water motors. To find the horse-power, multiply .00123 by the quantity of water in cubic feet per minute used on the wheel. Then multiply the result by the head of water in feet.

To find the quantity of water required in cubic feet per minute to generate a given horse-power with a known fall, multiply the horse-power by 815 and divide by the fall, or head, of water in feet.

Example 1.—What horse-power can be obtained from an overshot wheel 12 feet in diameter, using 200 cubic feet per minute? Answer: $.00123 \times 200 \times 12 = 2.95$ H. P.

Example 2.—How many cubic feet of water per minute is required to generate 20 horse-power, using an overshot wheel 22 feet in diameter? Answer: $20 \times 815 \div 22 = 741$ cubic feet.

Strength of Materials.—All those engaged in mining should thoroughly understand this important subject, and especially that branch relating to the breaking and working strain of ropes, bolts, chains, etc.

The number of accidents and fatalities arising from ignorance on this subject should be sufficient to compel all owners of mining property to insist upon superintendents and foremen being able at all times to provide ropes, bolts, chains, etc., of proper dimensions for the work required, and in this manner more work would be accomplished, and with far less risk and expense, than is generally the case.

I will first deal with wooden beams, and as a guide to further calculations the following table compiled from various authorities will be found useful. The columns marked *S*, *N*, *C*, *E* have the following interpretation:

S—Breaking load at center of beam when supported at both ends.

N—Breaking load when placed at one end and the other end fixed.

C—Safe load in center when beam is supported at both ends.

E—Safety load at end of beam when the other end is fixed.

The following table is based on a factor of safety of 7; that is to say, the safe load shown in table is only one-seventh of the calculated breaking load, and even this high factor of safety should be increased when using beams not free from knots and shake. In addition to the factor of safety, freedom from knots and shake, it must also be remembered that seasoned timber resists crushing much better than green timber, in many cases twice as well, and the figures given in this table are for good samples of timber; therefore, the factor of safety (7) should be adhered to.

The following figures and results are obtained from experiments with small pieces of timber, and therefore considerable allowance must be made for beams that are not of a uniform texture. I have only mentioned the various kinds of American woods that are in general use. Their various breaking strength and safe loads are given in round numbers, so that in working out different problems calculations mas be made as simple as possible:

Name of Wood.	Weight in lbs. per cu. ft.	Breaking load in lbs. S.	Breaking load in lbs. N.	Safe load in lbs. C.	Safe load in lbs. E.
Ash	45	590	147.50	84.29	21.07
Beech, white	43	440	110	62.86	15.71
Beech, red	44	570	142.50	81.43	20.36
Birch, black	45	680	170	97.14	24.29
Birch, yellow	44	440	110	62.96	15.74
Cedar, white	35	250	62.50	35.71	8.99
Fir, black	42	340	85	48.57	12.14
Hickory	50	700	175	100	25.00
Hickory, bt. nut	40	480	120	68.57	17.14
Larch	35	300	75	42.96	10.71
Oak, live	54	621	155.25	88.71	22.18
Oak, red	53	562	140.50	80.28	20.17
Oak, white	49	581	145 25	83	20.75
Pine, red	40	509	127.25	72.71	18.18
Pine, pitch	41	576	144	82.28	20.57
Pine, yellow	33	395	98.70	56.43	14.71
Pine, white	34	410	102.50	58.57	14.64
Pine, Virginian	38	485	121.25	69.28	17.32
Teak	56	673	168.25	96.14	26.03

The above figures represent the number of pounds required to fracture the various kinds of wood having an area or cross section of 1 square inch by 1 foot in length. In finding the strength of beams the following proportions of strength must be observed:

VALUES OF X.

(1.) With a beam fixed at one end and loaded at the other=1.

(2.) With a beam fixed at one end and the load distributed uniformly=2.

(3.) With a beam supported at both ends and loaded at the center=4.

(4.) With a beam firmly fixed at both ends and loaded at the center=6.

(5.) With a beam supported at both ends and uniformly loaded=8.

(6.) With a beam firmly fixed at both ends and uniformly loaded=12.

In calculating the strength of beams, the whole weight of the material must be included when the beam has a uniform load, and only half the weight of material when the load is placed at the center.

*Copyrighted by the Author.

Let S=tabular number of breaking load in pounds on a beam supported at both ends and loaded at the center.

N=tabular number for breaking load in pounds on a beam loaded at one end, and the other end firmly fixed.

C=safe load in pounds on center of beam supported at both ends.

E=safe load in pounds on a beam fixed at one end and loaded at the other.

b=breadth of beam in inches.

d=depth of beam in inches.

l=length of beam in feet.

w breaking load in pounds.

R w divided by 7=safe load in pounds.

x=proportion of strength due to position of load, and method of fixing the ends of the beam.

Square Beams.—The formula for finding breaking load is as follows:

$$w = \frac{b\,d^2\,N}{l} \times x$$

Example 1. What is the breaking load on a beam of American yellow pine, 12 inches deep, 12 inches broad and 20 feet long, one end of same being firmly fixed and the load at the other end?

Answer:

$$w = \frac{\frac{b\ d^2\ N}{12 \times 12^2 \times 98.7}}{\frac{20}{1}} \times \frac{x}{1} = \frac{12 \times 144 \times 98.7}{20} \times 1 = 85027.68 \text{lbs.}$$

or 37.95 tons. And the safe load would be $\frac{37.95}{7}$ or 5.42 tons.

Example 2. With same dimensions, but beam supported at both ends and loaded in the center, the breaking load will be:

$$\frac{\frac{b\ d^2\ N}{12 \times 12^2 \times 98.7}}{\frac{20}{1}} \times 4 = 37.95 \text{ tons} \times 4 = 151.80 \text{ tons.}$$

And the safe load would be $\frac{151.80}{7}$ or 21.68 tons.

Example 3. If the beam in example 1 was uniformly loaded, the safe load would be the same, viz., 5.42 tons multiplied by x, and by referring to the different proportions of strength tabulated we find in this instance where the beam is fixed at one end and uniformly loaded, x=2. Therefore the safe load would be $5.42 \times 2 = 10.84$ tons, thus showing that a beam will safely stand double the load when uniformly loaded than it will with load in the center.

Example 4. A beam of American pitch pine, 6 inches wide and 10 inches deep by 15 inches long, supported at both ends and uniformly loaded, the breaking and safe loads will be as follows:

$$w = \frac{b\,d^2\,N}{l} \times x \qquad \text{Safe load} = \frac{w}{7}$$

$$w = \frac{\frac{b\ d^2\ N}{6 \times 10^2 \times 144}}{\frac{15}{1}} = 5760 \text{lbs.} \times \frac{x}{8} = 46080 \text{lbs. or } 20.57 \text{ tons.}$$

and the safe load would be $\frac{20.57}{7}$ or 2.94 tons.

Example 5. Take the same beam as used in example 4 and lay it flatwise, or, that is, call it 10 inches wide and 6 inches deep, then the breaking strain would be:

$$\frac{\frac{b\ d^2\ N}{10 \times 6^2 \times 144}}{\frac{15}{1}} = 3456 \times \frac{x}{8} = 27648 \text{ lbs. or } 12.34 \text{ tons,}$$

and the safe load would be $\frac{12.34}{7} = 1.76$ tons,

or a little more than one-half the strength of the same beam laid edgewise.

(To be Continued.)

Recent Additions to the Mineral Collection of the California State Mining Bureau.

Rich silver ore with ruby silver; Zacatecas, Mexico. Thos. J. Barbour.

Gold quartz very rich in free gold and tellurides of gold and silver; Melones Con. M. Co., Calaveras county, Cal. Ralston & Grayson.

Mercury, native in rich cinnabar; Mirabel mine, Lake county, Cal. C. C. Derby.

Gold quartz showing free gold; Yellow Aster mine, Randsburg, Kern county, Cal. J. M. Kelley.

Gold quartz showing free gold; Norwegian mine, Tuolumne county, Cal. From the company, per Wm. C. Murdoch.

Gold quartz with "wire gold;" Lucky Boy mine, Lane county, Oregon. Emile Qure.

Martite in very fine crystals; Thomas Mountain, Utah.

Chenevixite, orpiment crystals, olivenite, tiemanite, sphalerite, pyrite, etc.—fine crystallized specimens; Utah.

Semi-anthracite coal of good quality; Skykomish, Washington. E. Weinheim.

Native mercury in silicious rock; from near Twin Peaks, San Francisco, Cal. Behrend Joost.

Auriferous conglomerate; Robinson mine, Johannesburg, South Africa. Jas. Reid.

Monazite sand; Morgantown, N. C. R. H. Renebome.

Six cut and polished specimens of marble; from California and other localities. A. L. Seager.

Large and well-shaped basalt column; Healdsburg, Sonoma county, Cal.

Gold ore, sylvanite (telluride of gold)—two very rich specimens, one raw and the other roasted; Arcadia mine, Cripple Creek, Colo. Wm. Cochran.

Quicksilver ores, five specimens from as many different mines; Pine Flat, Sonoma county, Cal., and one from the Corona mine, Napa county, Cal.

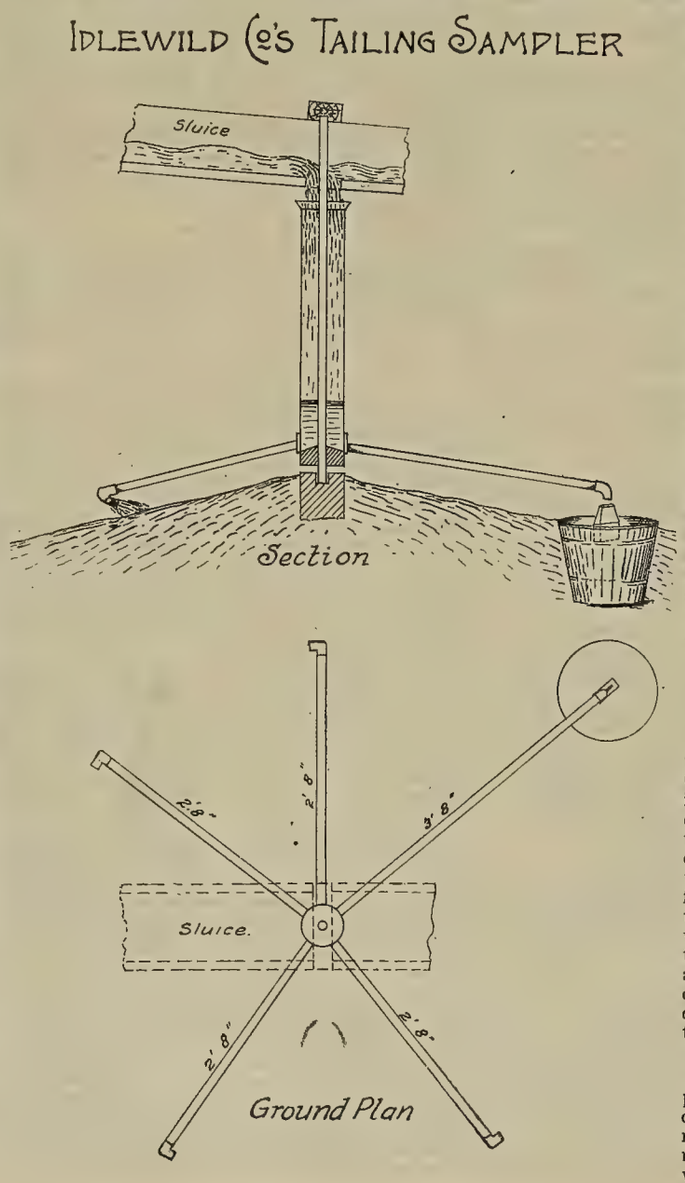
Fourteen fine crystallized specimens of various minerals, mostly from Utah, including two new species—wardite and bixbyite—the latter in cubes on topaz.

And a number of other ores from various mines of the coast.

HENRY S. DURDEN, Curator.

A Tailings Sampler.

A tailings sampler in use at the Idlewild or Taylor mine, at Greenwood, El Dorado county, is shown in the accompanying cut. It consists, in general terms, of a reaction water wheel, driven by the tailings water, with one of the arms extended 1 foot beyond the rest and with the outlet turned downward, in which it passes at each revolution over a covered bucket with a raised slot, $\frac{1}{16}$x4 inches, in the center of the lid, which permits of a small amount passing into the bucket.



TAILINGS SAMPLER AT THE IDLEWILD MINE.

STATE MINERALOGIST COOPER proposes to take up the study of opportunities for the development of electrical power in the mining regions. Such work would be of value not only to mining but many other industries.

From Mine to Mint.

NUMBER II.

By D. K. TUTTLE, Ph. D., Melter and Refiner of the United States Mint at Philadelphia

Parting and Refining Processes.—Gold and silver are not found native in a state of purity. Indeed, they seem to "hunt in couples." Our California nuggets contain, on an average, about 88 per cent gold, the balance being chiefly silver. Native silver has been found more nearly approaching purity, but even this contains enough gold to pay for parting. But by far the largest source of silver is the lead and copper ores of the West, in which it occurs accompanied by gold, in small percentage, it is true, but very important in value.

The lead ores are smelted to "base bullion," in which the gold and silver are caught. The lead smelter afterwards carries the concentrating process up to the point of dore bars, which are silver carrying gold as its chief impurity. These bars go to the refinery for parting.

The copper minerals of Montana, Arizona, etc., carry silver and gold, and the electrolytic process of refining the crude copper made from these ores is now an enormous industry. In this process the solution and current are so regulated that only pure copper passes over and is deposited on the cothode, while the original plate—the anode—is disintegrated and the impurities fall to the bottom of the tank as a mud, technically known as "slimes." This mud is a veritable drag net of nearly all the impurities known to the metallurgist, containing, besides gold and silver, notably copper, bismuth, antimony, arsenic, lead, sulphur, selenium and tellurium. After a more or less successful purification in the copper works, the resulting bullion is subjected to one of the parting and refining processes described below.

Some gold ores are associated with platinum and platiniridium. Iridosmine is rather abundant in the auriferous beach sands of northern California. Dentists' scrap again contains platinum, tin and copper. Jewelers' bars, resulting from the melting down of old jewelry, watch-cases, etc. (filled and solid), contain nearly all the metals used in the arts.

It will thus be seen that the material to be treated is of the most heterogeneous description, and not infrequently special methods have to be adopted. Thus, iridosmine is separated from gold by alloying the latter with sufficient silver to so diminish the specific gravity of the molten mass that the heavy iridosmine grains will settle to the bottom of the crucible. The silver and gold are then carefully poured off and parted by acids, as hereafter described.

Methods of Parting.—Three general methods are in use for parting gold and silver, known as the "nitric acid," the "sulphuric acid" and the "electrolytic" process, respectively. The latter is in use in a few private plants, where it gives satisfaction, but it seems to be better adapted to large smelting works, where argentiferous lead is purified, than to government refineries.

The electrolytic process is said to give satisfactory results only when the bullion to be parted has been refined in a cupel furnace until it contains not over 2 per cent of impurities (lead, copper, bismuth, etc.). None of our mints or assay offices can easily be provided with facilities for such wholesale cupelling operations, and the process has therefore been confined, as stated, to lead-smelting plants. It yields silver of exceptional purity (0.999½), and the estimated output of the few concerns using it is some 10,000,000 ounces fine silver per annum. As it is an interesting process from a scientific as well as industrial point of view, a short description may not be amiss before proceeding to deal with the methods in use at the government institutions.

Electrolytic Parting and Refining.—The silver carrying gold and a small percentage of impurities is cast from the cupel into flat plates about 18 inches long, 10 inches wide and one-half inch thick, weighing about 30 pounds each.

These plates form the anodes, and are suspended by three lugs cast on one of the long sides. They therefore hang with the greater length horizontal. Tanks of California redwood planks are very carefully made, 11 feet long by 2 feet wide and 20 inches deep (inside measure). Six partitions are placed crosswise in a tank so as to give seven separate cells or "baths." In each cell three plates or anodes are suspended, alternating with four cathodes. These latter are thin-rolled sheets of pure silver 13x20x$\frac{1}{32}$ inches thick, weighing 50 troy ounces each. The distance between anode and cathode is about 1¾ inches.

Both anodes and cathodes are suspended by conducting wires from copper rods resting on the edges of the tank. Two copper bars traverse these top edges and are connected with the respective poles of the dynamo. The cross-rods supporting the plates rest on these bars, but one end of the rod carrying an anode is insulated by a rubber band, while the opposite end of the rod carrying a cathode is insulated in like manner. The current must therefore pass from one conductor to the anodes, through the solution and the cathodes, to the return conductor. It will be seen that the current is divided between these seven cells and that we have 21 anodes connected in multiple with 28 cathodes.

A model plant consists of fourteen such tanks containing seven cells each. Ten of these tanks are constantly in circuit, four being in turn cut out for charging, discharging and possible repairs. These ten tanks are connected in series. The dynamo furnishes a current of 180 amperes, with an electromotive force of 90 volts. Such a current requires 22 horse power. The total cathode surface is 10 square feet in each tank. There is, therefore, a current density of 18 amperes per square foot of cathode surface. This is high as compared with that used in copper refining, but is purposely so in order that the silver may be deposited in coarse crystals nonadherent to the cathodes. The silver can then be easily brushed off and collected at short intervals. Thus the constant renewal of cathodes is avoided and an important saving effected in the stock of silver carried in the baths.

Each anode is inclosed in a muslin bag, which serves to catch the undissolved metals, which fall as a black slime. In this are found all the gold and bismuth, the greater part of the lead as peroxide, together with some silver and copper. Below this system of anodes, cathodes and bags in the bath is stretched on a box-like frame a piece of cloth, on which is gathered the deposited silver as it is scraped from the cathodes by wooden "brushes." These brushes straddle the cathodes without touching, and are kept moving to and fro by machinery, and they serve not only to brush off the silver as fast as it is deposited, thus preventing short circuits, but also to keep the solution uniform by gentle agitation.

The solution is one of silver and copper nitrate, to which about one per cent of nitric acid is added. The acid tends to prevent the deposition of copper with the silver, and about one pint is added to each bath every twenty-four hours. Three-eighths of one volt will decompose silver nitrate, while copper nitrate requires 1¼ volts and lead nitrate a still higher voltage.

In a slightly acid solution, containing silver, copper and lead nitrates, the current will not deposit a trace of anything but silver until the lead and copper get to be largely in excess of the silver. It is said that pure silver will be deposited from a solution containing one and one-half times as much copper as of silver. Of course, the gradual accumulation of impurities in the bath necessitates its gradual renewal by addition of fresh solution, the silver being precipitated from the portion withdrawn by salt water.

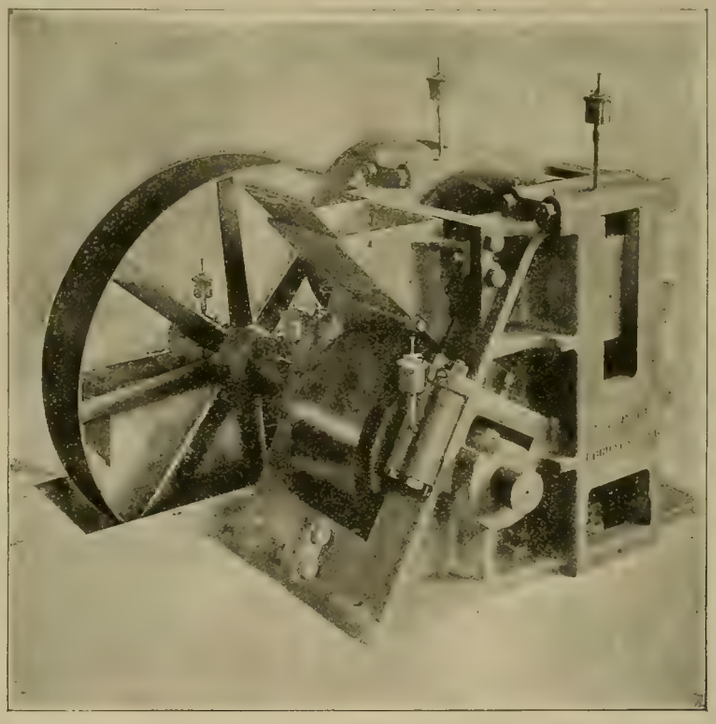
Each tank is cleaned of deposited silver every other day and of gold slimes once a week. A full-sized anode is dissolved in about two and one-half days. The crystalline silver is washed thoroughly with hot water, dried and melted. The gold slimes are melted, granulated and parted by acid.

Such a plant as described will produce about 33,000 ounces of fine silver each twenty-four hours.

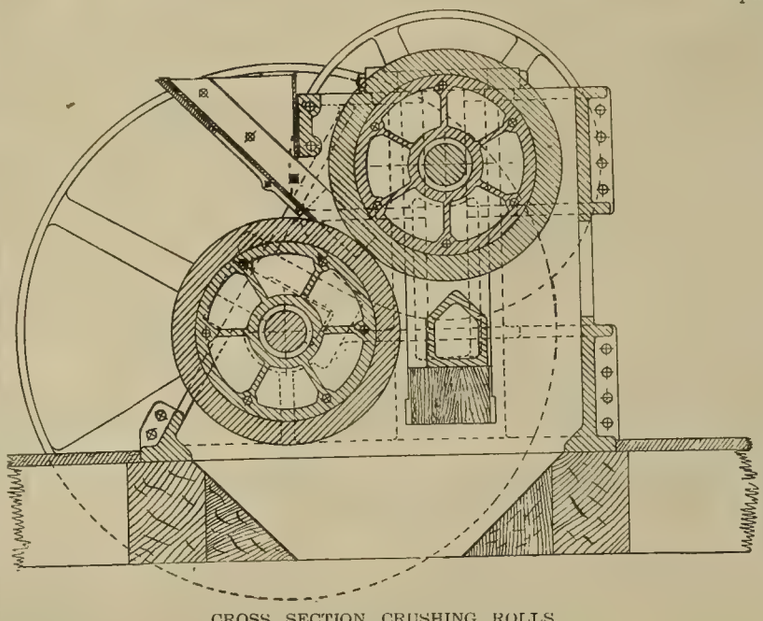
(To be Continued.)

Improved Crushing Rolls.

The engravings on this page illustrate this machine in the size 26 in. diameter by 14 in. face, arranged for belt drives. The two rolls are usually run at the same speed, most of the driving being done on the bottom roll. The main frame of the machine is made in two pieces, but may be further sectionalized if necessary. In each side of the frame is cast a heavy vertical guide. These guides are planed out true to receive the cast iron yoke piece on which the top roll is mounted. The rolls may be readily spaced for crushing to a given size by inserting two distance pieces of hard wood under the "U"-shaped yoke. The rolls are fed from a hopper placed to one side of the top roll as shown. The bottom of this hopper is made removable, giving free access to the rolls for cleaning, should the machine get choked up. The roll shells are made of either chilled cast iron, rolled steel, chrome steel, or manganese steel, as may be desired, and are fitted to the centers with machined surfaces, and are held in place by through bolts. These rolls may be driven either by belts direct, as shown in the cut, or by gearing with a countershaft.



ROGER'S IMPROVED CRUSHING ROLLS, 26 IN. DIAMETER, 14 IN. FACE.



CROSS SECTION CRUSHING ROLLS.

The principal advantages claimed by the manufacturers are: Owing to the way in which the rolls are arranged a thoroughly compact and substantial machine is possible, occupying about half the space of ordinary rolls. The customary springs by which the rolls are held together are only necessary in small machines, or where unusually hard material is to be crushed to a very fine pulp. The machine has but few parts and is easily taken apart for repairs; will pass pieces of drills, spikes or pieces of iron of moderate size without injury. Experience has shown that it takes less power than the ordinary style rolls by about 25 per cent, and for fine crushing has a much larger capacity.

The Parke & Lacy Co., 21 and 23 Fremont street, San Francisco, are sole agents for the Roger's Improved Crushing Rolls.

At a meeting of the Society of Mine Managers at Witten-am-Ruhr, the use of infusorial earth was advocated as a covering for boilers and steam pipes. It was stated at the meeting that its use effects a saving of 82 per cent in condensation water.

Mining Summary.

CALIFORNIA.

Amador.

Ledger: On the Central Eureka the operations are confined to drifting and crosscutting. Milling ore has been encountered in the south drift.

On the American mine, on Sutter Creek, Wilfred Dennis has recently completed a 10-stamp mill. He has a shaft down about 80 feet, in which at the bottom a ledge about 8 feet thick is exposed.

Butte.

Mercury: The old Red Point mine, Enterprise, is now owned by the Oregon Gold Mining Company, a San Francisco corporation, and is being prospected and opened up under the management of J. Champion. The present owners have run a tunnel which at a length of 540 feet taps the ledge 240 feet below the old works. The ledge here is about 4 feet wide.

The Golden Fissure, owned and operated by Shaw & Watson, is equipped with a 5-stamp mill, and a canvas plant is being added for saving the sulphrets.

At the Crystal Hill mine Fred Bachman is working in good rock. He has a 4-stamp mill.

Moore & McKay and Kitrick Bros. will build a 5-stamp mill this spring on their Little California mine north of the Middle Fork. A road to it is now being built.

Calaveras.

Prospect: A new company known as the Tracy Gold Mining Company was incorporated about a month ago with the intention principally of developing the Tracy mine, formerly known as the G. A. R. mine, in Angels mining district, about a mile and a half from Angels Camp. Every detail of the incorporation was completed and work commenced on the property about the first of the present month.

On the Steep Gulch mine on French Hill there has been a tunnel run in from the gulch which taps the lead at a depth of about 30 feet, at which point it shows a width of nearly 5 feet.

Rich ore has been struck in the Mitchel mine at Railroad Flat.

The final payment on the Donnallan or Gospel mine, three miles north of San Andreas, was made last week, and the mine, together with a 15-stamp water power mill, were turned over to the new owners, who are all Salt Lake people. The amount paid for the property was $22,525.

El Dorado.

Mountain Democrat: At Fairplay, Cy Mulkey has a force of men at work, drifting and ground-sluicing on Cedar creek, the work showing satisfactory results.

The Omo mine is getting out high-grade ore which shows gold freely through a 7-foot ledge.

The Philadelphia and Gold Note mine is closed down for a short time awaiting the decision of the stockholders as to who shall control.

At Diamond Springs work on the G. C. mine is progressing steadily at the tunnel, three shifs are employed and in twenty-seven days they have driven it ahead 217 feet.

Kern.

Californian: Garlock has another cyanide plant which will be in operation next week. This new plant will do custom work.

McNit, Snook and Baker in opening up a claim of theirs located on the desert about twenty miles from Garlock have struck rich rock.

Nevada.

(Special Correspondence).—This charming village of Washington, nestled among the mountains, nineteen miles northeast of Nevada City, is destined to become in the near future one of the thrifty and important mining centers of California. It lies on the southern bank of the South Yuba, whose cataract-like waters add romance to the little town, so like a Swiss alpine village. The place is reached easily, over a well-kept mountain road, with good stage service.

There is considerable prospecting now in active progress. On the Eureka a tunnel 132 feet, with over 600 feet "backs," has crosscut a 92-foot ledge that averages over $3 in free gold and carries considerable sulphurets. The footwall is slate and the hanging is serpentine.

The San Francisco, same formation, has two tunnels, the upper crosscutting a large body which has not yet been reached by the lower tunnel, which is 135 feet long. The property controls excellent water facilities. McCarthy & Condon are the owners.

Bell & French of San Francisco have bonded the Giant King, 1½ miles south of town, and have run two tunnels, the lower being 400 feet, with 300 feet backs, across a 72-foot ledge in a slate and porphyry formation.

The Gaston Ridge mine, owned mostly by New York people, six miles above Washington, is running a tunnel for the ledge, which they expect to reach within 175 feet. The tunnel is at present writing 1874 feet—so straight that one can see from its face the light of day at the mouth. Drills are operated by compressed air. Ventilation is obtained by the suction process, and the air in the tunnel is cold and pure as on the mountain top. This tunnel is expected to tap the ledge at a depth of over 1000 feet. The property was at one time a rich producer and was abandoned by C. D. Lane. The present company is incorporated under the laws of New Jersey. Dana Harmon is superintendent.

Meade & McBean have bonded two claims to the company operating the Gaston Ridge property. The tunnel has reached 700 feet. The chute, it is thought, will be reached within thirty days.

Bonnemort, Eastin & Moore have run 600 feet of tunnel, giving 300 feet backs, expecting to reach the ledge next week. The property is northeast of Washington, near Graniteville.

The Ormond, owned by Baron Von Schroeder, which was closed six years ago, is again being prospected. At the 400 level a good ore body is encountered. The south drift extends 425 feet on a 4-foot ledge, in slate walls, averaging above $8 in free gold. There are seventy tons of ore in the bin and there is ore in sight for many years' work. The property has a 20-stamp mill. Concentrators are en route and active production will soon be started.

The Yuba mine, five miles above Washington, owned by Haggin and the Hearst estate, which was abandoned four years ago at 800 feet depth, was recently bonded to Alf. Trigidgo, who expects soon to resume operations.

The German mine, near the Ormond, on the south bank of the Yuba, owned by the Shasta Mining Company, with a 10-stamp mill, is about to be rehabilitated. A visit to the mine reveals two tunnels in ore, the lower being 780 feet at a vertical depth of 265 feet from the surface. The ore, so far as opened, is from 4 to 26 feet, and mills from $5 to $13 per ton, exclusive of sulphurets. Free water the entire year, with a pressure of 212 feet, furnishes power.

The Mountain View, seven miles from Washington, on Canyon creek, is "on the contact," and has a tunnel 150 feet on a ledge of 5 feet. The ore is said to mill $7 per ton. This embodies two full claims. The Serious, in the same neighborhood, has a 200-foot tunnel on the ledge, with an upraise to the surface 120 feet, showing a ledge of from 1 to 4 feet. There are two claims in this property, 3000x 600 feet. The Arctic, adjoining these two properties, has two short prospect tunnels on a 4-foot ledge. These five properties can be operated by one plant. There is free water for power. These five claims are owned by Ole Helgensen of Washington, and, like most of the properties in this section, are awaiting capital to carry on operations.

Henry Kohler has a 200-foot tunnel on a 4-foot ledge, which is said to average $9.

The Spanish mine, three miles from Washington, is running ten stamps and four rotary mills. The formation is 100 feet wide. The country rock is slate. The cost of mining and milling this ore is 54 cents per ton, and it is taken to the mills from large surface cuts in the methods of a quarry.

Washington, Nevada Co., May 17th, '97.

Union: The Nevada City Mining Company has accepted the offer made by the London Exploration Company, of which Thomas Mein is the representative, and in all probability the latter company will take charge of the property in the course of a few weeks. The purchase price is in the neighborhood of $50,000. The Nevada City mine has a good reputation, and in years gone by yielded well. The shaft is down 800 feet and is at present filled with water.

The North Star Mining Company has commenced preparatory work for the sinking of a new 8x16 three-compartment shaft on Massachusetts Hill, through which the New York Hill, new Rocky Bar and a number of other mines in that immediate locality will be worked. This property will be known as the Central mine. It is calculated to sink a vertical shaft on the Central from 500 to 700 feet, at which depth the pay chute is expected to be encountered.

The ledge struck in the Massachusetts Hill recently is looking even better than when first encountered, and the North Star Company feel that conditions warrant them in making further explorations.

Placer.

Sentinel: The report of the Pioneer Mining Company of Boston for the eighteen months ending March 31st, shows:

RECEIPTS.

Production gold bullion	$ 77,368
18,500 shares treasury stock sold	95,500
Premium on gold coin	88
Interest account	1,065
Total receipts	$174,021

DISBURSEMENTS.

Pay roll and supplies	$104,743
Machinery, etc	13,150
Other expenses	9,280
Cash paid account new mines	10,000
Total disbursements	$137,173
Cash on hand	$ 36,848

Plumas.

National-Bulletin: In Granite Basin the Chicago company having the Robinson mine bonded will sink the shaft to a depth of 200 feet. It is now down over 100 feet.

At Grizzly Creek Dr. J. P. Welch and associates have from twenty to twenty-five men employed in putting the Joseph and other property in condition for active mining.

Dr. Saxton has six men employed in operating the Saxton hydraulic mine, which has a large and valuable bank of gravel.

San Diego.

Union: Mining men and capitalists from Los Angeles are going into the Chihuahua mining district in considerable numbers. The district is about twelve miles east of Oak Grove postoffice, fifteen miles north of Warner's ranch. New strikes are being made almost daily, and while the ore is low grade, the ledges are exceptionally large.

J. G. Shoemaker has sold to L. Schorm, for $600, the Daisy, Hardscrabble and other mining claims, situated in the Defiance district.

At Julian Mr. Tainge of the San Felipe mine is soon to return with machinery to handle the water in the mine.

A number of mining locations of claims in in the Laguna mountains have been recorded.

Shasta.

Free Press: At Copper City Sallee & McDonald have run a tunnel into the mountain over 1000 feet, and have exposed rich treasures in gold, silver and copper. For a distance of 400 feet the tunnel is in ore, and the end is not yet. How much farther this ore body extends can only be determined by pushing ahead. Like Iron mountain, it appears to be a whole mountain of ore, which, though base, is richer in gold and silver than the Iron Mountain range.

In Old Diggings district the Mammoth mine, owned by S. J. Cheney of Philadelphia, Pa., and which has been idle for several years past, is to be immediately reopened. Mr. Cheney has a contract with the Mountain Copper Company to furnish them with thirty to fifty tons of ore per day for use as flux in their smelters. The company has contracted to put in an endless ropeway from the mine to the smelter, a distance of about one mile, to convey the ore. According to the contract the work must be completed within the next sixty days. A force of about twenty miners will be employed in getting out the ore.

The Evening Star is being reopened. This property was recently sold by Frank Panter and Frank Litsch to W. M. Fitzhugh of San Francisco. The purchase price is said to have been $60,000, with $20,000 paid down. Russell L. Dunn has been placed in charge of the property. A site has been graded for the accommodation of a hoisting plant, which will be used in sinking a large shaft upon the property.

Searchlight: The rich discoveries in Harrison gulch during the past year and a half attracted prospectors to that section and the district is rapidly being extended by valuable new finds. Locations are reported over a section at least thirty miles in length by six or eight miles wide.

The new machinery for the addition to the Roberts mill is on the ground, and a force of men are at work excavating.

The crosscut being run to cut the Gold Hill ledge is now in about 350 feet, and 50 feet more will tap the ledge at a depth of 520 feet.

Fowler & Hurst have suspended work on their property temporarily. The new machinery will be put in immediately.

Steinmetzer, Huntington & Co. have bonded their properties to some Oakland parties.

The sale of the Fowler & Hurst properties in Harrison gulch to Capt. Roberts, has taken place, consideration $150,000. The mine is an extension of the Lucky Baldwin, and though hardly a year old, has already produced over $50,000, with but a 5-stamp mill in operation. The property has been developed by means of two tunnels and an upraise and thousands of dollars are now in sight. It adjoins the Lucky Baldwin on the east, and is one of the best developed properties in the gulch. Roberts now owns a complete succession of mines on the best portion of the known Harrison gulch lead. Early last year he purchased for $37,500 the Lucky Baldwin and Gold Hill mine from Fowler, Rhodes and Benton. He also bought out the interest of W. R. Conant.

At the Milkmaid mine at French gulch recently purchased by Jones, Hamilton and others of Nevada, lumber is now being hauled for the new mill and the machinery is expected to arrive shortly. Several men have been added to the force.

The Niagara mine at French gulch which is awaiting the change of the company's reorganization from the Dutch company, will start up about the first of June.

Negotiations are now under way, whereby Frank Panter and Frank Litsch will dispose of the Evening Star mine near Newtown to San Francisco parties for the lump sum of $60,000.

Morris, Norton & Weir of Buckeye, on the Top Notch, near Churchtown, have run a 180-tunnel and have two well-defined ledges.

L. L. Bettys has a force of men at work on the Trinity Consolidated mine on Dog creek, and has started up the mill.

McCourt & West have let a contract for a crosscut tunnel 75 feet in length on the Gold Standard on Treasury hill.

Siskiyou.

News: The Taylor quartz mine in Cottonwood district is being developed by a new tunnel being driven at a lower point on the ledge.

C. B. Poole is in over 400 feet on the tunnel on his mine at the head of Empire creek. He has a 21-foot ledge of low-grade ore.

The Nugget hydraulic mine, owned by Finley & Sons, is running steadily on pay gravel. They have surveyed ground for a new ditch to take water from White's gulch, a distance of four miles, which will enable them to work the year round.

Allen Davis & Co. are pushing work again in their 420-foot tunnel on the Bonanza King quartz mine. This is a prospecting tunnel, but some fine-looking ore has been taken out.

The hydraulic mines of Forks of Salmon are still running full blast; and although the season will probably be shorter than usual on account of the scarcity of water, the indications are that the yield of gold will be larger than usual.

W. P. Bennett and E. McLaughlin are opening up the old Crapo mine on Schoolhouse Flat. They will put on two giants and a large string of pipe and be ready for operation about the 20th inst.

Journal: Work is being carried on with as much speed as possible at the hydraulic mines in Oro Fino. They are all anticipating a good cleanup this season and will probably be enabled to work until about July 4th.

The Jones quartz mine in Quartz valley is turning out some rich ore at present.

Clute, Neal and Winsell are working a hydraulic mine on Hungry creek, and are doing very well.

The Steamboat mine expects to accomplish some good work this season. They will employ ten or twelve men on the mine, and with their pumps the water can be handled.

The Seattle placer mine on Thompson creek is still closed down and it is uncertain as to when it will be opened up again. It is unfortunate that this mine should be closed after the company have built their ditch and put in first-class machinery.

Journal: At the Nanetta B. mine on Thompson creek, a cleanup from a six days' run last week yielded $6,000.

The Salmon River Hydraulic Mining Coming, this side of Sawyer's Bar, is accomplishing some good work this season.

The river mining companies on the Klamath river are all hoisting pay gravel at present, and some of them are already taking out considerable gold.

Tuolumne.

Mother Lode: At the Dutch, sinking the shaft will be resumed in three weeks. From the 450 level the company intend to sink 750 or 1000 feet on the ledge. The richness of the ore in the drifts still continues. The ten additional stamps now being put in will be ready to drop in six weeks.

North of the Buchanan lies the Modoc. The company are working on a 16-inch vein of good pay rock. Considerable development work has been mapped out which the company intend to prosecute with all possible speed.

Independent: The Golden Star has just let a contract of $6000 to run a tunnel to tap the ledge.

The Soulsby mine has struck a large vein in their drift north of the shaft which is very rich.

The Belle mine, near Tuttletown, has been bonded by Superintendent Blake who has already commenced active operations.

The Draper mine has struck a new shoot of ore north of the old rich shoot which was worked in early days to a depth of 300 feet.

Union-Democrat: On the Gagnene a hoisting plant, suitable for sinking to a depth of 1200 feet, is in operation on the north shaft, and the 150 and 300 feet levels are being driven south in good milling ore. Work on the south shaft will be commenced at once, and a mill with a capacity of from 50 to 100 tons of ore per day is to be erected. A large amount of ore above the levels is now ready for milling.

On the Providence mine the shaft is down 160 feet, showing at the bottom a strong 6-foot vein of rock that is rich in free gold, with a large percentage of sulphurets. A 10-stamp mill is to be erected in the near future.

At the Confidence the new 20-stamp mill will be running in a few days. Already 450 tons of ore are in the bins awaiting reduction, while fifteen men are employed in extracting more.

At the Gerrymander ten men are employed. An old mill is on the property, but will shortly have to give way to a more modern plant. They have an 8-foot vein, carrying a big per centage of sulphurets.

The Pereira and Slonicker mine at Mormon creek is running in a 700-foot tunnel to tap the vein. The property is bonded to San Francisco parties.

The Street mine at Tuttletown still continues to show good ore.

At the Lady Washington, McGillivray and associates are arranging to place on the property a roller mill of good capacity.

At the Grizzly mine grading is being done preparatory to putting in the foundation for a new hoisting works.

The new Era, in Hunter canyon, owned by John Trewartha and Chas. Holland, is to be reopened. This is an extension of the Buchanan and was a good property in the past. The improvements consist of a hoisting works and 10-stamp mill.

The Bell mine, between Tuttletown and Robinson's Ferry, on the Mother lode, and belonging to Fred Sutton and Rowe Brothers, has been bonded to George Blake and others. Preparations are now being made for a hoisting plant, and a shaft will be sunk.

A Stock company is shortly to be formed for the purpose of operating the Silver Queen mine, at Yankee Hill, the property of G. W. Mapes.

NEVADA.

W. E. Price and B. A. Cardwell have bonded a lode claim about twenty miles north of Reno. The ledge at the surface of the ground is about 3 feet in thickness. The rock carries gold, silver and copper. It is their intention to begin development at once.

Gold Creek *News*: May 13th the water at the tower in Little Sun Flower reservoir stood at a depth of 15 feet 2 inches. This represents a storage of 194,000,000 gallons of water. The maximum flow in the ditch has reached about 1110 inches. This is emptying into the reservoir nearly 15,000,000 gallons a day. The reservoir is nearly one-fourth full. At the rate the water is now coming in it will take about forty days to store the other 600,000,000 gallons.

Pioche *Record*: In the Magnolia at De Lamar the winze from the tunnel level is down nearly 100 feet, and when the 100-foot mark is reached drifting on the ledge northward will begin. The winze is all in ore of high grade.

The new 500-horse power engine at the De Lamar mill is now running full blast.

Dayton *Times*: Work has commenced on the dredge putting the machinery in repair to hoist and screen tailings from the Carson river, to be worked in a leaching plant which has been ready for two weeks to receive these tailings. The tailings are to be hoisted and screened on a barge, then forced ashore through a large pipe into a reservoir. Here they will be allowed to remain until thoroughly dried, and then hauled by teams to the leaching plant.

It is reported that quite a rich strike has been made in the Topnotch mine, in Smith valley. The new mill is about completed and the stamps will begin dropping soon.

At Silver City the Taylor mill is running on ore from the Succor and Lager Beer mines. About twenty men are employed in both mines.

Austin *Reveille*: The Ione Gold Mining Co.'s 10-stamp mill is running steady and the returns are highly satisfactory. The mine

is improving and the ledge becomes larger as depth is attained and still holds its richness. Nine men are employed in the mine, five of whom keep the mill running.

OREGON.

Grant's Pass *Observer*: In the Waldo district Weimer Brothers have 2,100 inches of water with about 175 feet pressure. Four giants were operated last winter. Twelve men is the usual force employed during the season at the mine. They are now completing the new flumes on the old Darkas ditch, which nearly doubles the quantity of water for the time.

In the George Simmons mine a large cut for an outlet for debris had to be run to the Illinois river nearly two miles distant. This mine is operated nine to ten months every year, and employment is given to from eight to a twelve men.

On Galice creek the Alexander-Bent placer mine is the largest hydraulic mine in this district. It comprises 510 acres of patented land and extends along an ancient river channel over three and one half miles in length, far above the present bed of Galice creek. The water supply is taken out of the west fork of Galice creek, and is conveyed seven miles to the mine, giving a pressure of from 335 to 500 feet.

Rogue River *Courier*: Supt. Weston has struck what he has been tunneling after for the last two years on the Summit gold mine ledge, at the head of Althouse. At a depth of 435 feet he opened a rich ledge of quartz on the 23rd of last month and the miners are into it now 8 feet but there is no sign of getting through. This means a chlorination plant in the Althouse country.

The new 2-stamp mill for the Ajax mine at Mt. Reuben is on the ground and will be crushing ore at that point soon.

Dowell & Belding's 5-stamp mill started up last week on Green's creek.

Jacksonville *Democratic Times*: A new 5-stamp mill will soon be in operation at the Jewett mine near Grant's Pass.

Swinden, Still & Co., on Oscar creek, cleaned up their season's work last week, with satisfactory results.

Belding & Dowell, on Green's creek, have a new 4-stamp mill in operation.

The cleanup of the Rocky Gulch Mining Company in Galice creek district was a satisfactory one. The company has plenty of water yet.

BRITISH COLUMBIA.

(Special Correspondence).—Copper finds are the order of the day. Rich strikes of copper are reported at Cowichan lake and Douglas lake. The properties were located by farmers, who have left their plows to hunt for gold, and are being tested and sold in Vancouver.

This week a rich find was made on Lynn creek, South Vancouver, barely outside the city limits proper. The surface rock assays gold, silver and copper.

Bottles of metal water are being exhibited in Vancouver just now, accompanied by certificates stating that the water assays 20 pounds of copper to every 200 gallons of water. The water is said to come from a ledge in the Blackwater Camp, Lillooet district, so named owing to the color of the stream flowing through it. The water seeps through the ledge and trickles down the mountain.

A deposit of copper ore running 11 per cent in that metal has been discovered three miles from Union, B. C., on Vancouver island. It resembles the Michigan copper. The ledge is 5 feet wide and very accessible.

The Fire Mountain Company have run a tunnel in their property on Tepella mountain, near Harrison lake, Westminster district, 100 feet, and assayed 600 pounds of rock off the surface of the two closely joined fissure veins, running 5 feet wide. The company at once ordered a mill and will crush on the 15th of June or before that date. The lake below this claim is staked around its complete border. Many of these properties are commencing to ship.

Vancouver, May 16, '97.

Spokane *Chronicle*: All the bins and chutes at the Columbia and Kootenay are full of ore and the foreman has received orders to get ready to ship ore. He says that without any inconvenience he can ship over sixty tons per day.

At the Iron Mask the output has recently been about eighty tons a week. All of this has been hauled down to the Columbia & Western Railroad in wagons and then transported to the Trail smelter.

From the Cliff mine shipments of ore will begin on the 20th of this month in earnest.

Smith & Whiteman have bonded the Big Four No. 2 group, on the middle fork of Murphy creek, for $25,000. They are acting for an English syndicate, which has already acquired numerous interests in the Trail creek camp. The Big Four No. 2 group consists of six claims, covering about 300 acres.

Spokesman-Review: At Greenwood, a tunnel to be run 250 feet has been started on the Sunset claim. The property is held on a bond by Montreal and Vancouver parties, who also have a bond on the Silver Crown claim.

E. A. Bielenberg is developing the Anaconda group, in Deadwood camp.

John Douglas has put a force of men on the Silver King, in Shylark camp. This vein has an immense capping of pyrrhotite, as well as a small vein of high-grade silver-gold ore.

Leslie Hill, manager for the Prospecting Syndicate of British Columbia, is calling for tenders to sink a 50-foot shaft on the Crown Point camp.

At Fairview camp about fifty men are at work, half of whom are employed at the Joe Dandy property, the balance at the Smuggler and Tin Horn claims.

In the Slocan, the Lexington, Polly and Sunnyside mines have been sold to E. J. and A. W. McCune for $20,000. The properties will be incorporated at once under the name of the Lexington Mining Company; capital, $1,000,000. The control of the Bonanza, I. X. L., Excelsior and Slocan Belle claims have also been purchased by the McCunes.

On the west fork of Kettle river galena ore carrying about forty per cent lead and a few ounces of silver was recently found by prospectors, and a number of locations have already been made.

At New Denver on the Galena Farm the ledge at the 200-foot level is of unknown extent, and a level is about to be started both ways on it. Water power is soon to replace the present steam hoisting and pumping plant, and the 150-ton concentrator and air compressor plant will soon be placed in position.

Rossland *Miner*: There is a great improvement in the Josie deep shaft. Ever since the 100-foot level was passed there has been ore in what was supposed to be the hanging wall. This has varied in width from a foot to 3 feet and has been of good grade. The foot wall has been well defined all the way down and all the ledge matter heavily mineralized. When the 200-foot level was reached a round of holes was put into what was supposed to be the hanging wall, and the drill revealed 4 feet of solid, high-grade copper ore.

UTAH.

Salt Lake *Tribune*: At Park City Kearns & Weber have recently put thirty men to work jigging the ore on the Silver King second-class dump, and as soon as the new crusher and concentrating plant are put in working order, which work is being rapidly pushed, the force will be increased.

The Butters experimental plant, in the Dooly block, is nearing completion. The effort will be to find a process best adapted to the treatment of ores of every variety, and that this may be accomplished no expense is being spared in the equipment of the plant, which is one of the largest of the kind that has been undertaken in this country. The experiments will be confined to the ores of no particular locality, although much attention will be given to arsenical ores that have been a source of so much trouble to the miner since the Mercur district came into prominence.

Mercur *Mercury*: At the Gold Dust a good deal of cinnabar has been found, some of it carrying as high as $40 per ton. At the top of the hill on the west side of the claims two tunnels have been run into the vein, which comes nearly to the surface.

During the past ten days in the Daisy the vein on the incline has been gradually widening out from 4 feet. It was not known how thick it was on the lower level until this week, when a crosscut was made through the ore to strike the foot wall. It was then learned that the ore body was 16 feet 4 inches thick.

Work is being prosecuted in both the upper and lower drifts of the Wonder shaft, and twelve men are employed, working three shifts.

A contract has been let by Walker Brothers for sinking another 100 feet on their claims near the mouth of Ophir canyon.

Bingham *Bulletin*: In the Dalton & Lark a large body of ore has been encountered in the drift off the 640-foot level. Developments have proved it to be 15 feet wide, of which 6 feet is high grade and the balance milling.

Work is rapidly progressing on the site for the Highland Boy mill, which is now nearly ready for the foundation. About thirty-five men are employed.

The new company to operate the Winnamuck property having taken formal possession, it is understood that operations are soon to begin on an extensive scale, including ore production for market, which has been entirely suspended for many months.

Park *Patriot*: The work of cutting the station in the 1300-foot level of the Daly-West has begun.

Two shifts are working on the Deer Valley Consolidated. The prospects grow better as work progresses. An immense amount of work has been done on this property.

Tintic *Miner*: Shipments for the week are reported as follows: From the Bullion-Beck mine, 15 carloads ore; Bullion-Beck mill, 5 carloads concentrates; Eureka Hill mine, 9 carloads ore; Eureka Hill mill, 5 carloads concentrates; Centennial-Eureka, 2 carloads ore; Mammoth mill, 10 carloads concentrates; Sioux mine, 3 carloads ore; South Swansea, 5 carloads ore; North Star, 3 carloads ore; Dragon iron mine, 1 carload ore daily.

Indications in the great Bullion-Beck tunnel are reported to be growing more favorable daily. The territory crossed by this tunnel site is among the most promising mineral sections of the district.

G. H. Murray commenced this week on the development of the South Wheeler lode, which is a large fraction joining the Wheeler ground, in which a good strike of ore was reported a short time ago.

The Ferguson Brothers have commenced work on the Gray Eagle, west of Eureka.

C. E. Hudson and Paul Rodenhouse are preparing to commence work on the Silver Cloud. They will timber the 192-foot shaft and immediately commence drifting to the vein.

IDAHO.

Spokesman-Review: At Loomis the Palmer mountain tunnel is in 300 feet.

The Red Jacket and Little Falls quartz claims have recently been bonded to Frank Raborg of Spokane, with a 10 per cent cash payment.

The contractors on the crosscut at the 80-foot level on the Mammoth claim, one of the properties of the Whisky Hill Mining and Tunnel Company, have completed their work, and the ledge shows a width of 40 feet, all in ore, and have not yet secured either wall.

The managers of the Detroit-Windsor Mining Company have secured bids on 400 feet of tunnel and 20 feet of shaft work.

The Wyandotte Company are improving their cyanide process plant on the Similkameen river. The company have advertised for bids for 400 feet of tunnel work on one of their claims.

Near Kendrick the recent discovery of copper ore on Little Bear creek continues to be the all-absorbing topic.

The Cyprus Mining Company have a force of men at work on their property, which has a ledge of well-defined mineralized ore measuring 15 feet between walls. A force of men will be put to work driving a 400-foot tunnel, which is expected to strike the ledge, which crops out on the brow of a hill some distance above.

MONTANA.

Mining World: Efforts to reorganize the Hope Company at Basin have come to naught, and last week the pumps on the lower levels were taken to the surface. It will only be a few days now until the levels are flooded with water and the mine will once more be idle. Owing to the many complications, legal as well as others, there is little hope for the mine and mill again being operated for some time to come.

The Easton mine and mill at Virginia City have again resumed operations under the superintendency of Mr. Pankey. A force of thirty men is employed, which will be increased as soon as room can be made.

At Neihart there are six mines and several prospects at work, employing nearly 200 miners, and shipping about 12,500 tons of ore annually. This ore consists principally of sulphur compounds of silver and lead. In the vicinity of Neihart there are located 300 mining claims, of which government patents have been procured for about 200.

Butte *Miner*: The Parrot Copper Mining Company has resumed operations at the Moscow mine.

The Butte & Boston Consolidated Mining Company is making improvements on the surface and underground, one of the largest gallows frames in the district having just been erected at the Blue Jay.

The Boston & Montana Consolidated Copper and Mining Company has the Atlantic shaft down nearly to the 800-foot level and an air compressor was recently added to the plant. At the Leonard shaft over 600 tons of ore are hoisted daily. At the West Colusa good progress is made in enlarging and sinking the shaft.

The Montana Ore Purchasing Company has commenced sinking on the Nippur mine, the water having been pumped out. The shaft on the Nippur is now down 300 feet, and an additional 250 feet will be sunk before crosscutting will be done.

WYOMING.

During last season the owners of the Rambler copper mine at Battle Lake, in the course of development work, done with primitive means and crude machinery, took out over 100 tons of ore and shipped it to the smelter. The average of the entire output now, in copper, is about 45 per cent. The tunnel is 300 feet in length, and the shaft is down 150 feet from the surface. The width of the vein is about 4 feet, and the formation is pure quartzite.

The Garfield mine, near Atlantic City, in Fremont county, has some 500 feet of shafts sunk and 1,000 feet of tunnels run. The output of the mine thus far has been over $400,000 in gold.

COLORADO.

Republican: The success of three tunnels in finding ore and proving their utility as drainage and transportation enterprises has increased the importance of these propositions in Cripple Creek, and it is not surprising that tunnel companies are coming more into favor. The Squaw mountain, the Cripple Creek, and Gold Hill, and Chicago and Cripple Creek are now steady shippers of good ore, and the two last named having come into ore since the beginning of the year, have done much to advance the tunnel into favor. There is not a hill in the district that has not one or more tunnels driving toward its mineral core, and a dozen of them are equipped with steam plants for efficient and rapid work.

Two workings planned to run under the entire district at great depth are now in the hands of Eastern capitalists and may be started under full headway, equipped with machinery plants, at any time. They are the Watson and the American, both running from the Cripple Creek slope, and now being kept alive by hand work. The first named of these will prospect Guyot hill, and in a short distance will reach the heart of the gold belt, and is looked upon as one of the big workings that will some time be a necessity to the camp.

The Johnston lease on the Republic of the Mary McKinnie Company is turning out large quantities of rich ore. The breast of the drift on No. 2 vein now shows 8 feet of ore.

Production from the Anchoria-Leland for the past week ran 250 tons of ore, much of it of high grade coming from the Maloney crosscut vein, and also from the new chute reached by an upraise from the first level from the new shaft.

At Idaho Springs the Sun and Moon mine continues to attract attention because of its rich strikes of free gold in the ores coming from the shaft at 370 feet. In starting a level at this depth the streak which had heretofore carried mostly lead values began changing to a copper ore and now there is about 10 inches of smelting ore showing both lead and copper with free gold throughout the entire width.

The Alkire properties at Dumont have been opened out by a tunnel now being driven to reach several lodes lying far into the mountains. The distance now gained is 565 feet, and because of a parallel lode coming in it will be followed instead of continuing the crosscutting.

P. R. Stanhope is opening up the Silent Friend mine with a number of drifts, some of which are into the mountain nearly 1,000 feet.

The Boston Company operating the Eagle mine on Albro hill has made an important strike of mineral in the shaft at a depth of 350 feet and this is being drifted on with marked results. Three feet of pay ore is showing and for a distance of 300 feet it has remained continuous in the levels.

At Creede at present the mine owners estimate that about 400 men are being employed.

Over 300 cars, loaded with ore, left Creede camp in March, and this amount was exceeded in April by 200 car loads. The tonnage for April borders on 8,400 tons.

The Commodore mine is by far the heaviest shipper at present. This mine is now employing about 200 miners, and the shipments average 150 tons per day.

A strike was recently made within the corporate limits of the town of Creede by A. Kleasner in the Jo Jo claim, which has every indication of being the Commodore extension, in which a very wide vein of a low grade ore has been uncovered.

For the month ending April 30th, ore shipments from the Black Hawk depot numbered 298 cars, aggregating 4,798 tons, which represented the output of smelting ores only of the county for that month. As compared with the corresponding month of last year, this last month's shipments show an increase of eighty-six cars, or 1,376 tons of ore, and shows the same proportionate increase as in the preceding month of this year.

At Aspen the Deep shaft, which has been shut down since the summer of 1892, will start up within a few days. This comes from a reliable source, and the machinery and shaft are now being repaired.

At Telluride the Columbia-Menona mines and 30-stamp mill will be running full capacity in the next few days. Driving east and west drifts on the vein from the intersection of a crosscut tunnel, which cut it 850 feet below the surface and 450 feet below the upper workings, is being prosecuted and valuable gold, silver and lead ore is being taken out.

The Tom Boy mine and mill are running regularly and turning out from 150 to 175 tons daily, although the mine is susceptible of a much larger output. The Tom Boy vein is expected to be cut any hour by the mill tunnel crosscut, which has been in course for two years past. It is in 1,900 feet, the distance estimated by surveyors that it would be necessary to drive to reach it.

Several additional men were put to work today in the Nellie mine, Bear creek, which is being developed under lease and bond by the North American Exploration Company, principally composed of European capitalists.

The completion of the sale of the Caledonia in England only awaits a few routine details. The bond has been taken up, the money paid and the deed passed from W. S. Stratton. A new compressor plant recently installed is being utilized in crosscutting.

Production from the Victor for April has run close to the usual amount, and the earnings have been between $30,000 and $35,000. The mine has been running with a reduction of one-third in the force, but the tonnage reached 1,500 tons, besides 1000 tons broken on the stulls.

The Golden Cycle Company is taking position as one of the heaviest shippers in the district, the output for the past month having reached 1,500 tons of $40 average grade. A new level, the fifth, is now being opened at 376 feet and finds the ore in larger body.

The Gold Crater Company is shipping about 300 tons of mill ore a week. Prospecting the territory goes on steadily. It is said on good authority that W. S. Stratton is closing a deal with the Chicago & Cripple Creek Tunnel Company, by which that working will be crowded under Globe with all possible speed, to prospect the Gold Crater and Plymouth Rock groups.

ARIZONA.

Phœnix *Republican*: At Oro Blanco, in the Tres Amigos mine, the owners have uncovered the richest gold ore that has ever been found in the district. The ledge proper is about 4 feet wide, all good grade gold ore, but 6 inches of it is extremely rich.

On the Oro Blanco mining claim a parallel ledge was recently discovered which all these years has passed unnoticed, and yet it carries not only coarse free gold largely, but horn silver also; but the reason was because the metals were in a decomposed porphyry, as unlikely looking as the adjoining country rocks.

The Sooner mine, an 800-foot claim adjoining the Sorrel Top, and from which excellent ore has been worked in an arrastra, has been bonded to F. G. Wulzer & Co.

AUSTRALIA.

The following table of exports of gold shows the steady increase in yield of West Australia:

	1897.		1896.		1895.	
	Ozs.	£	Ozs.	£	Ozs.	£
Jan.....	40,386	153,469	16,350	62,130	18,617	71,009
Feb....	32,526	123,593	17,922	68,104	15,509	58,935
March..	40,296	153,126	11,085	42,122	10,619	74,554
April..	.....	.....	16,773	63,736	19,128	72,687
May ...	.....	.....	22,266	84,611	19,208	72,991
June...	.....	.....	27,933	106,148	16,129	61,299
July ...	.....	.....	16,258	61,712	20,195	76,743
August.	.....	.....	20,517	112,164	23,669	79,940
Sept....	.....	.....	35,301	134,135	18,245	69,940
Oct....	.....	.....	27,331	100,156	27,726	105,357
Nov....	.....	.....	30,874	117,322	15,508	58,930
Dec....	.....	.....	29,653	112,681	17,890	67,092
Total.	113,208	430,198	281,263	1,061,800	231,513	879,748

The Queensland gold returns for April are as follows:

	Tons Crushed.	*Yield in Ozs.*
Charters Towers.....	28,500	28,900
Mount Morgan.....	8,300	13,000
Gympie.....	5,100	8,700
Croydon.....	3,400	4,700
Other fields.....	7,400	6,900
Alluvial.....	.....	2,000
Total output.....	52,000	64,200

The calls paid in the Charters Towers district amounted to £5,000; dividends, £28,900. The calls at Gympie were £6,500; dividends, £18,000. Croydon calls, £1,500; dividends, £14,600. Mount Morgan, no calls; dividends, £25,000.

Scientific Progress.

The Deepest Well.

The deepest well in the world will soon be completed near Pittsburg, Pa. It is now more than one mile deep, and when finished it may reach down two miles into the earth. It is being bored in the interest of science. The object in penetrating so deeply is to determine just what the interior of the human footstool is like. From a commercial point of view the well was a success long ago. At comparatively few feet below the surface, both gas and oil were struck in paying quantities, but the company owning the plant determined to dedicate it to science and invited Prof. William Hallock of Columbia College to carry on a series of temperature investigations as the hole is carried deeper and deeper into the earth. The results of these investigations are very interesting, and it is the opinion of several well-known scientists that the ultimate result of the boring will prove to be of widespread economic as well as of scientific value. Most significant of all the facts so far ascertained is that the well grows steadily hotter as its depth increases.

The temperature of the Pittsburg well, at a depth of 5000 feet, was found to be 120.9 degrees Fahrenheit. At the bottom the temperature is 128 degrees Fahrenheit. The well in its present stage is 5502 feet deep. This gradual rise is found to exist all over the world, although it is more marked in some places than in others. In a deep well near Wheeling, W. Va., the temperature is 51 degrees at the top and 110 degrees at the depth of 4500 feet. In the Sperenberg salt well, near Berlin, the temperature is about 47 degrees at the top and 118 degrees at a depth of 4170 feet. In the Schaladabach salt well, near Liepsic, the surface temperature is about 51 degrees, while at 5740 feet it runs up to 135.5 degrees. External conditions seem in no way to affect the temperatures of the wells.

A LARGE Dussand microphonograph, now being constructed for the Paris exhibition of 1900, is expected to make the voice heard by 10,000 people. This form of apparatus is especially designed for the deaf, and for the study of the feeble sounds given out by the organs of the body in health and disease. It magnifies the voice much as a lens magnifies objects to the eye. The register is a modified phonograph, with a diaphragm vibrated by small electro-magnets receiving currents through a microphone; the repeater is somewhat similar, with a microphone attached to the membrane, the current for this being obtained from one to sixty battery cells and thence passing to a telephone. The intensity depends upon the amount of current passing. The instrument is being used in the education of deaf mutes, and has had a marked effect in stimulating the nerves and apparatus of hearing.

FOR hardening heavy lathe and planer tools for hard work, where the steel has been selected at random and is found a little too low in hardening properties for the purpose, take one pail of soft water, one-quarter pound cyanide of potassium, one pound salt, one dessert spoonful oil of vitriol. Draw the temper slightly. This is Hunt's tempering recipe.—Crescent Anvil.

PROF. ELMER GATES of Washington claims to have produced an absolutely perfect vacuum by filling a very infusible test tube with a glass melting at much lower temperature. Then by inverting the test tube and partially withdrawing the molten glass by suction, a space was left which, when the glass had solidified, was claimed to be perfectly vacuous.

SIR HENRY THOMPSON has presented the Royal Observatory at Greenwich with a telescope said to be the most powerful instrument at present existing for the prosecution of astronomical research by means of photography. The photographic refractor has an object glass 26 inches in diameter. The photographs it will take will be on twice the scale of 2 mm. to one minute of arc, and its short focal length gives it great light-gathering power. The instrument now mounted at Greenwich has been in course of construction by Sir Howard Grubb of Dublin during the last three years.

Electro-Capillary Light.

In a contribution to *Wiedemann's Annalen*, No. 12, Herr O. Schutt of Jena describes a new electric discharge phenomenon, which he terms electro-capillary light. When the discharge of an induction coil is sent through a narrow capillary tube of about 0.05 millimeter in diameter, provided with aluminum or copper electrodes and filled with air under ordinary pressures, an intense luminosity of the thread of air is obtained—a luminosity which is intrinsically far superior to that of the arc, and would form an exceedingly powerful source of light, if it could be made continuous. The narrow capillaries deteriorated rapidly, roughening inside, and were blown into a series of spherical enlargements. Wider tubes gave less light, but were much more permanent. At the same time the bright lines in the continuous spectrum in the original light became more prominent. At pressures above one atmosphere the phenomena were nearly the same, but the sparks passed with greater difficulty. At low pressures the light became less intense, the continuous spectrum faded, and the bright lines shone out more distinctly. The kind of glass is immaterial. It is stated that the tubes may be made twenty centimeters long and make splendid line sources.

Mechanical Progress.

The Use of Compressed Air for Mining Purposes.

NUMBER II.

A lecture delivered to the Engineering Students of the Leland Stanford Jr. University, May 3, 1897, by EDWARD A. RIX, M. Am. Soc. M. E.

I have spoken only of the energy *stored* in the air after it is compressed. There is, however, a perfectly mechanical translation of energy from the prime mover to the air motor, that we call the energy of full pressure and is that part of the work performed in an air compressor or given out in a motor, which takes place at constant temperature, or, in other words, is the work performed by the piston to discharge the air from the cylinder. I might call it an air piston rod, which reaches from the compressor to the motor, and conveys the energy of one to the other absolutely mechanically, and in the case of isothermal compression would act just the same as if a column of water reached from the compressor piston to the motor piston. It is nothing but a flexible piston rod, acting during the period of full pressure only, and stops when the compressor stops, unless the air receiver be infinite in its capacity. It is this air piston rod only, which direct acting pumps and ordinary motors and rock drills use, thus availing themselves of a mere mechanical phase incident to the operation of a compressor and abandoning entirely the real work which is stored in the compressed air itself and which is practically three times the value of the other. It would be just as sensible to judge the economy of a steam engine by its full pressure work only, as to do so in an air engine.

I have been thus explicit on this somewhat puzzling point because I wish it well understood that the least possible power expended in compression gives the highest resultant efficiency and is the first condition precedent to an economical air plant. You are all no doubt familiar with the way to produce this, viz., highest form of prime motor, compound compression where proper, minimum frictions in all moving parts, slow piston speeds, least clearances, large valve areas and cooling surfaces, so that heat of compression shall be as nearly constant and at initial temperature as possible, or in other words isothermal. It is always, you perceive, a case of temperatures.

Now in using the air after compression, or in other words, to utilize as much of its intrinsic energy as possible, we become involved in a case of temperatures again, and it is precisely the reverse in all ways and considerations of the phenomena of compression. If it be true that difference of temperature between the admission and exhaust of the air in a compressor is the head to be overcome by the prime mover in reaching a certain receiver pressure, it is evident this difference should be made as small as possible, and reversing the case for air motors, it is evident it should be made as large as possible. Everything would tend toward the accomplishment of this fact readily were it not for the presence of moisture in the air, which, while it offers no difficulty to compression, which is a heat developing phenomena, freezes at once during expansion, which is a cold producing phenomena. This freezing has nothing to do theoretically with the perfect operation of the air in its expansion, but practically it fills up the valve ports with ice, congeals the lubricants, and the motor stops. These temperatures ranges often as low as −150 degrees.

Inasmuch as it matters not between what degrees of temperature we do our expansion, so long as we maintain the same difference, it must occur to the engineer at once that if in expanding from atmospheric temperature downward he meets with the mechanical obstruction of ice, he must slide his range of temperatures up the scale until the final exhaust temperature shall be such that ice will not form. Inasmuch as this cannot be done without supplying extraneous heat, either before or during expansion, the idea of reheating is at once suggested, and upon it hinges the whole subject of the economical use of compressed air.

In determining the amount of heat to be applied to the air before use, it will be found that no great temperatures are required, averaging generally about 150 degrees Fahr., to exhaust at 32 degrees Fahr., and gives complete expansion to the atmosphere.

Inasmuch as every degree we add to the temperature of the air before use increases its head, provided we exhaust always at the same temperature, and inasmuch as lubricants will not be destroyed at 400 degrees Fahr., or even more, it comes as a natural conclusion that while we are reheating we should go to the practical limit, and especially as it is found by experience that the additional fuel required is of little consequence.

The increase of power obtained by this increase of volume (for that is the way the increased temperature manifests itself) ranges from 0 to 60%, at an expenditure of fuel which, after reduction to terms of the prime mover power, means an addition of from zero to 10% of that power, depending upon the head and price of water, or price of fuel. A gain of 50% at an expenditure of 10% may in some cases be made to cover all losses of compression and transmission, and deliver to the motor the full amount of power expended upon the air at the compressor, or even more.

It need not be demonstrated here that the use of fuel to expand air is from five to seven times more economical than it can be used in any other manner to generate power.

Having thus shown you the proper and natural conditions under which to compress and to use air after it is compressed, and having also called your attention to the requirements of a modern air compressor, the motor is the last thing and the most important thing to be considered. It appears to me that inventors and builders of compressed air machinery are devoting too much time to the compressor and none at all to the special air motor. Compressors can be made having an efficiency approximating 90%, while the average motor using the air from such a compressor would not give 40%.

(To be Continued.)

Electrical Progress.

High-Frequency Currents and the Human Body.

M. d'Arsonval recently sent a communication to the Societe Internationale des Electriciens concerning the therapeutic and physiological effects of high frequency currents. He showed the powerful inductive effects which can be obtained with these currents. A striking experiment consists of placing three lamps in tension and allowing the current to pass through the body. These currents cause no sensations, and a man placed in a circuit does not feel that he is traversed by the currents which brilliantly illuminate the lamps. The principal results of this electrification are an augmentation of the oxidations in the organism and an increase in the production of heat. A subject who, under ordinary conditions, eliminates 17 to 21 liters of carbonic acid per hour throws off 37 liters after having been submitted to this action. High-frequency currents do not act solely upon the surface of the body, but also profoundly upon the interior. All of these results have been obtained upon a number of subjects by MM. Apostoli and Charrin. M. d'Arsonval cited, in closing, the action exercised upon microbes and bacteria by these currents. The microbes and bacilli are modified, and the toxines are killed and transformed to vaccine. MM. d'Arsonval and Charrin hope by this method to arrive at a direct treatment for the interior of the bodies of patients suffering from zymotic disease, and experiments to this end have begun.

Electrical Conductivity of Ether.

John Trowbridge, in the *American Journal of Science*, discusses the "Electrical Conductivity of Ether." By the method employed the author thinks he obtains an estimate of the energy required to produce the Rontgen rays and also a measure of resistance of sparks in air and different media. He closes thus: "It shows conclusively that the discharge in a Crookes tube at the instant when the Rontgen rays are being emitted most intensely is an oscillatory discharge. In popular language it can be maintained that a discharge of lightning a mile long under certain conditions encounters no more resistance during its oscillations than one of a foot in length. In other words, Ohm's law does not hold for electric sparks in air or gases. Disruptive discharges in gases and in air appear to be of the nature of voltaic arcs. Each oscillation can be considered as forming an arc. It is well known that a minute spark precedes the formation of the voltaic arc in air. The medium is first broken down and then the arc follows. I believe that this process occurs also in a vacuum and that absolute contact is not necessary to start the arc. My experiments lead me to conclude that under very high electrical stress the ether breaks down and becomes a good conductor."

UNDER a new process by which copper is cast pure, it is stated that this metal acquires an additional tensile strength of 33⅓ per cent, and possesses a conductivity of 95 per cent when compared with the best rolled copper. It is stated also that the discovery is anticipated to occasion distinct changes in the construction of dynamos, motors, and other electrical plant, inasmuch as the new metal is believed to carry the same current with only one-third of weight ordinarily used. The change which is represented as being effected in the molecular structure of the metal may be accounted for by the theory that the shape of the crystals has been altered so that their lines are parallel, and that the molecules are consequently brought closer together, and into more intimate contact with each other.

THE Belgian Government has decided upon a trial of electric carriages on the ordinary State railways, starting with the nine-mile run between Brussels and

Tervueren. The Belgians are adopting the accumulator system, notwithstanding the known difficulties attending its use. The speed is to be 31 miles, reduced to 18½ miles an hour on the steepest gradients. The accumulators weigh 12 tons, the electric motors and appliances 10 tons, and the cars, which are 52½ feet long, on two bogies, and carrying eighty passengers, weigh 20 tons. The accumulators may be charged to run for 72 miles. The motors are to be compound wound, the pressure of current being 500 volts. At 15 amperes the motors will run at 116 revolutions per minute, the field magnet only being excited by the shunt winding. When connected in parallel they will make 231 revolutions, the total current being 150 amperes.

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Why the Springer Concentrator is the Best:

It will do more and cleaner work than any rubber belt machine.
It weighs only one-half as much as some of the six-foot concentrators.
Is the most simple in its construction of any machine in the market, and only one-third as many pieces in it as in some of the others. Was invented by an old miner of forty years' experience handling every known concentrator on the market.
Should any piece need repairing, it can be removed without disturbing any other part of the machine.
Can be set up by any inexperienced miner.
Its distributor is perfection itself, distributing the pulp evenly over the entire surface of the belt.
Grade of shaking frame can be changed while the machine is running at full speed.
It is the strongest, lightest running and most inexpensive to keep in repair of any
Will save more of the fine slimes than any other machine.
Is cheaper than any other six-foot machine, costing only $350.00 f. o. b. cars or boat, San Francisco.
Will handle the pulp from five stamps better than any other Concentrator.
Has adjustable eccentrics, and any length of stroke can be had, thereby giving different speeds per minute.
The belt is very durable, being made of No. 3 Canvas, woven especially for the Springer concentrator.
This machine requires so little attention that one man will easily attend to a dozen of them.
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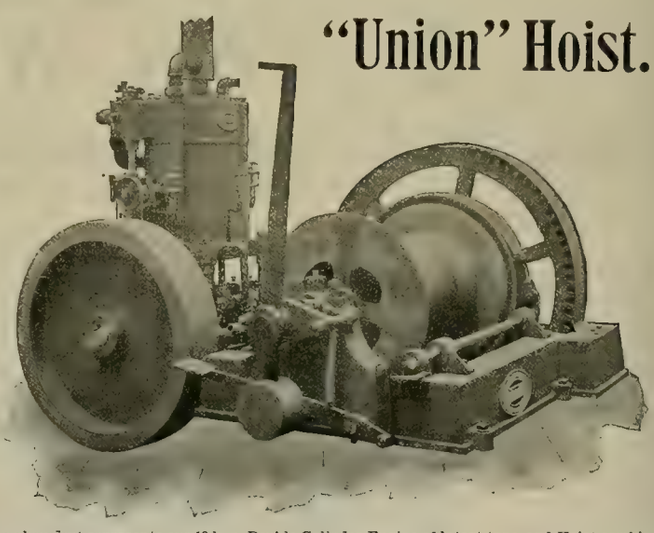
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Coast Industrial Notes.

—J. A. Vaughan of Otay, San Diego county, Cal., has put out 5000 tobacco plants in one acre near that town.

—The Pasadena & Pacific road, between Pasadena and Los Angeles, it is expected, will be completed and in operation by July 1st.

—At St. Helena, California, $2,500 of stock in the proposed creamary has been subscribed, and the total required, $4,000, will soon be obtained.

—In Ventura county the California Asphaltum Company gave employment to forty men last week, with the expectation of increasing the force soon.

—The school bond election at Chino, California, last week, resulted in favor of the issuance of $20,000 bonds for the improvement of the school buildings of the Chino district.

—The rails of the Valley road were laid to the site of the depot at Hanford last Tuesday. Big preparations have beem made for the celebration of the arrival of the first passenger train to-day.

—Petitions are being circulated in San Jose asking Mayor Koch to call a mass meeting of citizens for next Tuesday evening at Hale's Hall for the purpose of considering the improvement of Alviso channel.

—The estimated shipments of fruit from San Diego since January 1st are 264 carloads, over three-fourths as much as was shipped in 1896. Six hundred carloads of lemons and oranges will be shipped from that city during 1897.

—The biggest pipe contract ever signed in Santa Barbara has just been concluded by the Alcatraz Asphalt Company. The contract calls for forty miles of piping, and involves an expenditure of $60,000. The Alcatraz Asphalt Company will use the pipe to convey asphalt from its mines at Sisquoc to the coast.

—The Chino sugar factory people expect to handle over 10,000 acres of beets from the middle of July to the middle of November. That means something like $650,000 worth of beets. Chino alone will grow 7000 acres of beets this year. The factory will be prepared to use 2000 tons of beets every twenty-four hours.

Personal.

W. C. RALSTON left last Monday for New York and will be gone about a month.

SHERWOOD HOPKINS has been appointed superintendent of the Gold Hill mine at Grass Valley.

HENRY BRATNOBER has gone to Telluride, Colo., to look into the progress of work on the Tomboy.

CAPTAIN THOMAS MEIN is about to sail to Alaska to look after the properties of the Exploration Co. of London.

OSCAR B. LEWIS of this city will probably be appointed superintendent of construction of the new San Francisco postoffice building.

VICTOR M. CLEMENT, who recently examined the Mercur mine in Utah and the De Lamar in Nevada, is in London, as is also Capt. J. B. De Lamar.

MANAGER F. W. BRADLEY of the Bunker Hill & Sullivan mine at Wardner, Idaho, who has been for some time in California, has returned to his properties.

HAMILTON SMITH, as at present arranged, will come out to this coast this summer and go up to look at the Alaska-Treadwell and other properties controlled by the Exploration Co. in Alaska.

GOV. BUDD has appointed John R. Price, engineer of the Board of Public Works, and W. L. Ashe of San Francisco as members of the Bureau of Highways to succeed J. L. Maude and R. C. Irvine, and Marsden Manson to succeed himself.

Recently Declared Mining Dividends.

Cariboo Mining & Smelting Co., Camp McKinney, B. C., $16,000; payable May 14. The total to date is $157,410.

Mercur, Utah, $25,000; payable May 20—a total of $700,000.

Silver King, Utah, $37,500; payable May 11.

Reco, Sandon, British Columbia, $50,000; payable May 20. The total to date is $187,500.

Recent California Mining Incorporations.

Winona Mining Company, San Francisco; E. G. Heinz, G. W. Tomb, J. T. McCormick, J. L. H. Manning, W. L. White; capital stock $100,000; stock subscribed $25.

Commercial Paragraphs.

THE Pacific Sheet Metal Works of this city has established a branch at Los Angeles, under the name of the Los Angeles Metal Works. Cans for fruit, meat, lard, honey, oil, etc., also family fruit cans and galvanized goods of all descriptions will be manufactured at rates that will compete with similar Eastern goods. This will give employment to a large number of men and keep in local circles money that would otherwise go abroad. The works adjoin the Southern California Packing Company and will be under the management of L. S. Porter.

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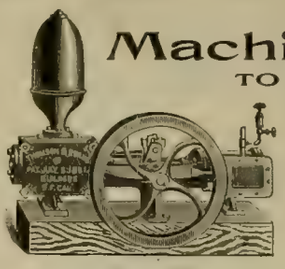
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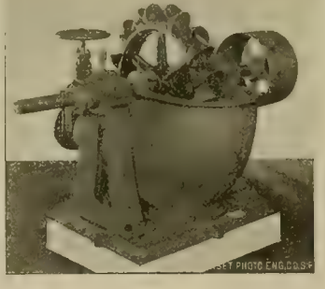
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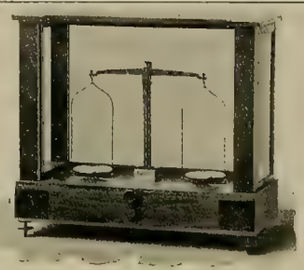
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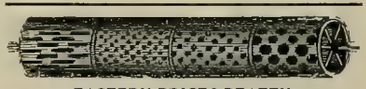


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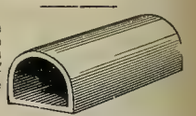


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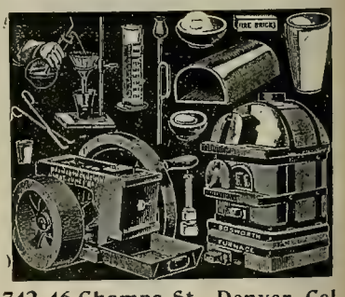


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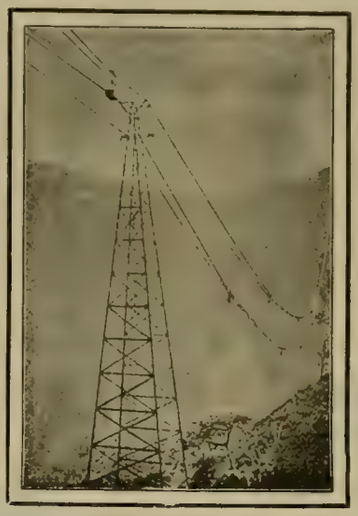
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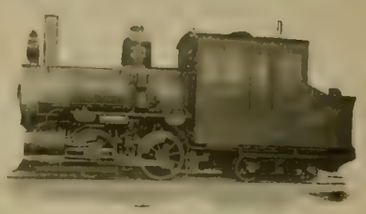
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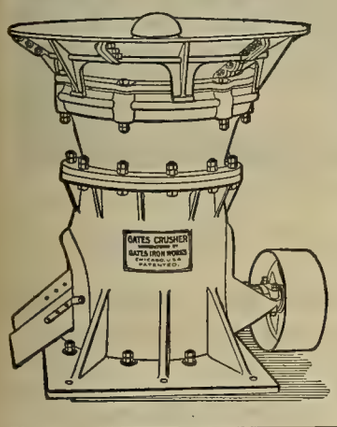
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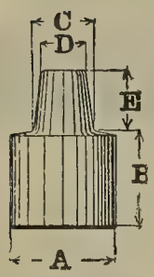
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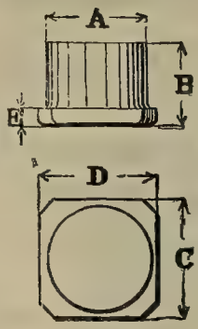
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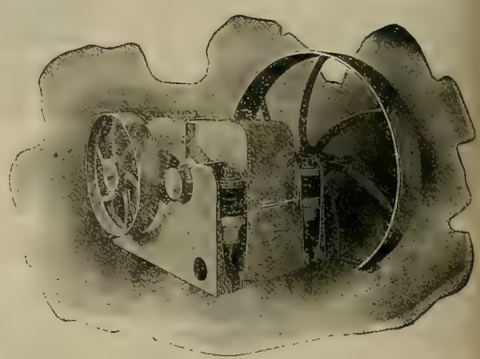
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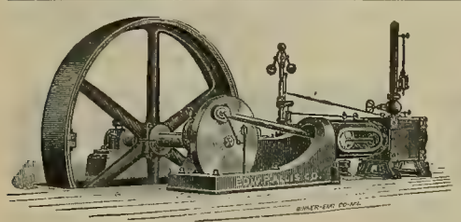
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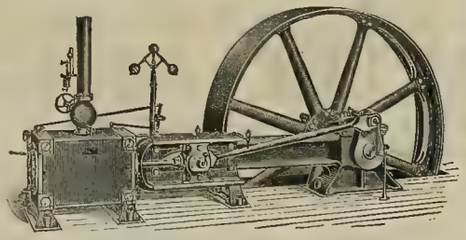
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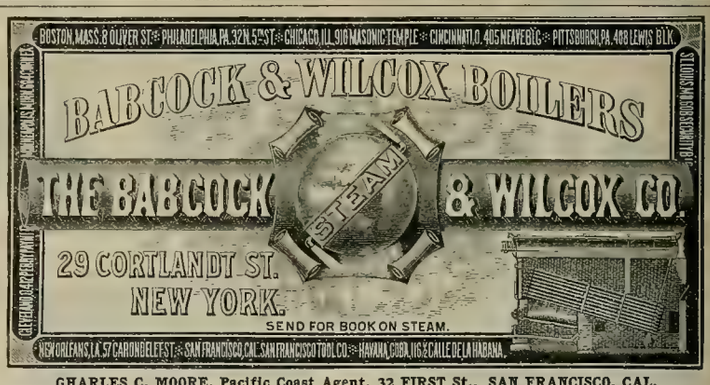
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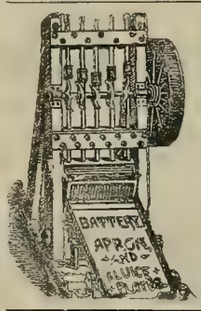
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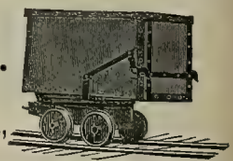


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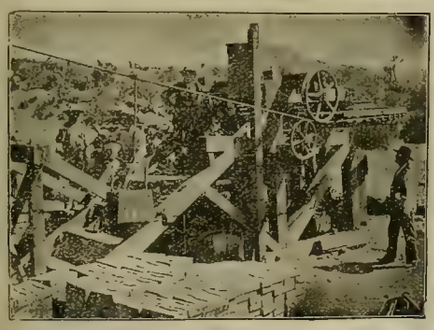
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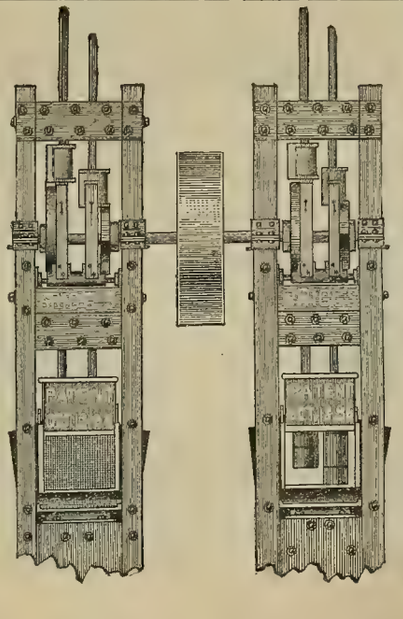
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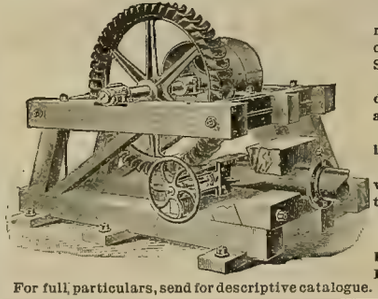
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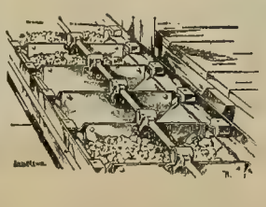
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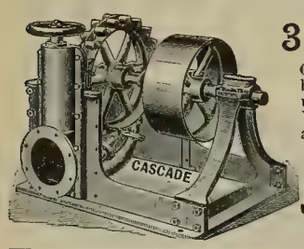
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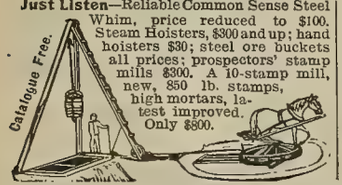
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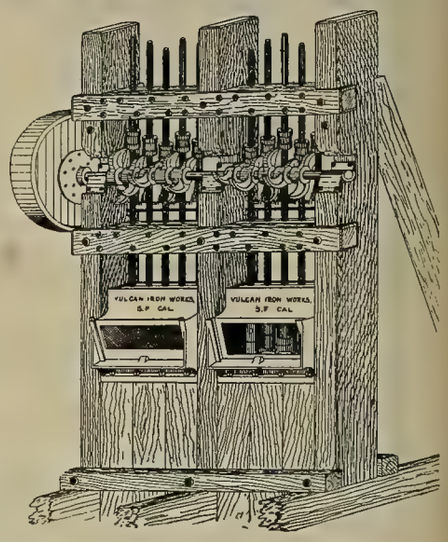
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Stamp Mills

Of the Latest Improved Design for

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For Conveying Ore, Etc.

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IF YOU HAVE A SMELTER--YOU WANT IT.
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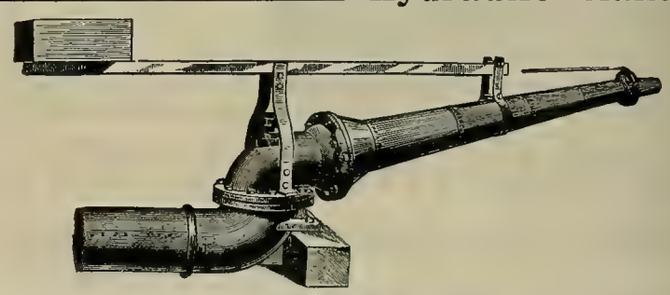
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Double-Jointed Ball-Bearing Hydraulic Giants.



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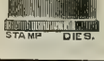
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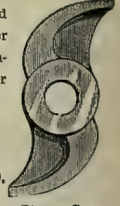


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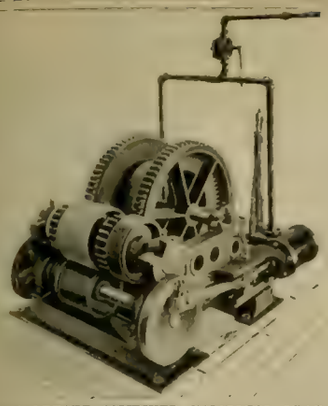


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6x8 BOLTHOFF COMBINED NOISELESS GEAR AND FRICTION HOIST.—Pat Oct. 6, 1896

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—Gen. Sheridan to Gen. Grant

"Push things."
—Gen. Grant to Gen. Sheridan.

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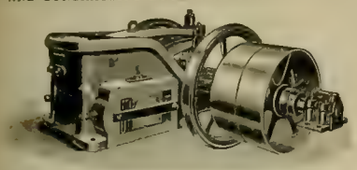
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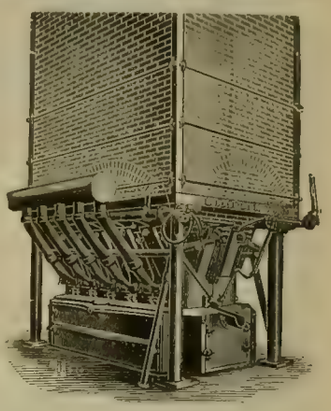
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Standard Silver-Lead Water Jacket Smelting Furnace.

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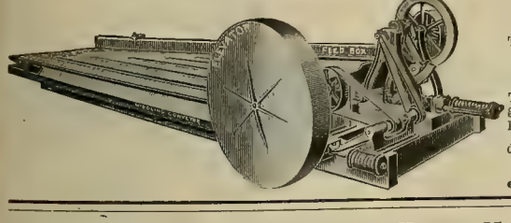
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PIPE, PACKING, RUBBER BELTING, AND SUPPLIES OF ALL KINDS.

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And claim for it BETTER work than any Concentrator made, with a capacity of from 15 to 25 tons per day of 24 hours. It is simplicity itself. No moving belts or intricate parts. Any one can learn to operate in an hour.

WILFLEY CONCENTRATOR.



For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Colo.; Mary Murphy Mine, St. Elmo, Colo. W. E. Renshaw, Mayflower Mill, Idaho Springs, Colo.; H. E. Woods, Denver, Colo.

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THE CONOMARA MINE. THE SMUGGLER CONCENTRATOR. THE SMUGGLER MINING CO.

ASPEN, COLORADO, April 8, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Your favor of the 5th inst. at hand and noted. In regard to the Wilfley Table I wish to say that I consider it to be the best device in use to-day for concentrating fine ores; that it will save everything that a gold pan will; that it combines the clean saving of a Rittinger with the capacity of a buddle. I think that without question it will supplant in time all other devices for handling fine and slimy ores. This includes all the vanning machines and buddles.
This is higher praise than I am in the habit of giving, but I feel sure that it is deserved, and you may make any use of this that you desire. Yours very truly,
[SIGNED] S. I. HALLETT.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

PRICE, $450.00.

DYNAMOS.

MOTORS AND ARMATURE WINDING.
Commutators Rebuilt. Amalgam Plates.
FLINT & LOMAX, Denver, Colo.

DEWEY & CO. SCIENTIFIC PRESS PATENTS PATENT AGENCY 220 MARKET ST. S.F.

Market Reports.

The Markets.

SAN FRANCISCO, May 20, 1897.

Business in nearly all branches is reported by jobbers to be steadily enlarging, with an increasing call from farming and mining districts. Manufacturers report enough orders in hand to run them for some time to come, but the margin of profit has been greatly reduced by close competition. There is a continued good inquiry for structural and railway materials and also for mining machinery.

In the money market there is nothing new to report. The call for crop moving purposes is light. This is said to be due to the fact that requirements are met almost entirely by interior banks. With increasing quotations of fruits going east New York exchange ought to sell lower. Sterling bills are weak, but notwithstanding this gold is still being sent to Europe. New York reports a low rate of interest—1¼@1½ per cent per year on call loans.

New York Silver Prices.

NEW YORK, May 20.—Following are the closing prices for the week:

	London.	N. Y.
Friday	28 1-16	61⅛
Saturday	28 1-16	61⅛
Monday	28⅛	61⅛
Tuesday	27¾	60⅝
Wednesday	27⅝	60¼
Thursday	27½	60

	Copper.	Lead.	Iron.	Tin.
Fri.	11 00 @—	3 30	10 00@12 00	13 35
Sat.	11 00 @—	3 25	10 00@12 00	13 35
Mon.	11 00 @11 12½	3 30	10 00@12 00	13 30
Tue.	11 00 @11 25	3 27½	10 00@12 00	13 30
Wed.	11 00 @11 25	3 30	10 00@12 00	13 30
Thur.	11 00 @11 25	3 30	10 00@12 00	13 30

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	17½c Prem
New York Telegraphic Transfer	20c Prem
London Bankers' 60 days	$4.87¼
London Merchants	$4.85
London Sight Bankers	$4.88½
Refined Silver, per oz., 1000 fine	60¾
Mexican Dollars	49@50

SILVER.—The market strengthened on reports that China had negotiated a large loan chiefly for railroad building, but weakened off on receipt of news that there was trouble owing to jealousy between the favored nations—one or two not having interest in the loan.

Pixley & Abell report shipment of silver from London to India, China and the Straits to May 1 as follows, compared with the corresponding period of 1896:

Year.	India.	China.	Straits.	Total.
1897	£1,884,850	£ 44,512	£ 57,092	£1,986,455
1896	1,575,298	427,450	282,882	2,285,630

MEXICAN DOLLARS.—Our market continues to be reported nominally unchanged, with a light demand ruling. The East quotes the dollars in quantities below 48 cents.

QUICKSILVER.—There is an increasing demand. Exports by sea the past week aggregate 120 flasks to Central America and 300 flasks to Mexico. This is the largest single week shipment for over a year.

Our market is quoted at $40.50 for domestic consumption.

COPPER.—With confirmed advices of an armistice between Greece and Turkey which will lead to peace, the markets at home and abroad have improved, closing the week quite strong.

The local market is quoted as follows:

Ingot, jobbing	—@14
Ingot, wholesale	—@13
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17

TIN—The consumption of plate and pig is a full average, but about all wants were met by canners the fore part of the year. The market is steady.

We quote as follows in a jobbing way:

Pig, per lb	14c@ —
Plate, I C coke, heavy, per box	$4 00@ 4 15
" " " light, "	3 90@ —

LEAD—There is a continued free consumption. The market is fairly firm.

Our market is quoted in jobbing lots as follows:

Pig	4 00 @	4 25
Bar	@	4 50
Sheet	5 62½@	6 12½
Pipe	4 87½@	5 37½

SHOT.—There is a fair jobbing demand.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

POWDER—There is a free movement for mining purposes. A vessel sailed the past week for Mexican ports which took out nearly 52,000 pounds.

The market is quoted as follows for Hercules: No. 1, from 11½c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

BORAX—There is nothing new to report.

The market is quoted as follows:

Refined, in carload lots, in barrels	5
Refined, in carload lots in sacks	4¾
Powdered, in car lots	5
Concentrated, "	4½

IRON.—The East continues to report weak and unsettled markets, with cutting still the order. Our market is quoted nominally unchanged, but it is reported that concessions are obtainable.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—The market is unchanged. There is a fair demand for the season. The agitation for a higher tariff is having some effect.

We quote as follows:

SPOT FROM YARD—PER TON.

Wellington	$8 00@— —
Greta	6 00@ 6 50
Nanaimo	6 50@ 7 00
Gilman	5 50@ 6 00
Seattle	5 50@ 6 00
Coos Bay	—@ 4 75
Cannel	8 00@— —
Egg, hard	12 00@13 00
Wallsend	6 50@— —

TO ARRIVE—CARGO LOTS.

Australian	5 50
Liverpool Steam	6 25
Scotch Splint	— —
Cardiff	6 25
Lehigh Lump	9 00
Cumberland	13 00
Egg, hard	10 00
West Hartley	6 50

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

ANTIMONY. — The market is steady and quiet.

Our market is quoted at 7¼@8¼c in a jobbing way. New York mail advices quote 7½c for Cookson's, 6⅞@7¾c for Hallett's and 6⅞@7c for Japanese.

NAILS.—The market is steady.

Wire, carloads, basis per keg	....
" jobbing, " "	$2 20
Cut, carloads, " "	....
" jobbing, " "	2 10

PLATINUM.—There is a fair demand.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC. — The market is quiet at steady prices.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steadier.

We quote in jobbing lots at 50 cents per pound for ingots.

Chemicals.

In our market there are no features of special interest to report. The East reports unsettled markets in nearly every line, while English advices state their markets are steady to firm.

SPELTER — The market is maintained steady by not forcing sales.

We quote our market in a jobbing way at 5 cents a pound.

BISMUTH.—There is a fair demand.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is steadier.

We quote in a jobbing way at 70 to 75 cents per pound.

BONEASH.—The market is steady.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is firm at 3c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a slow demand at 2½c a pound from stores.

NITRATE OF SODA.—In our market there is nothing new to report.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

SULPHURIC ACID.—The demand is light.

We quote in a jobbing way at 1½c per lb for 66%.

NITRIC ACID.—Our market is reported steady from store at 6½@7c per pound in carboys.

BLUE VITRIOL. — Our market is fairly steady.

We quote in a jobbing way at 4½c per pound.

Mining Share Market.

SAN FRANCISCO, May 20, 1897.

The market has been spasmodically active, with strength only shown in Chollar, and Potosi a sympathizer. Con. Virginia, which had been the leader, hung around $1.85 to $1.90, with the other north end shares barely steady. The Gold Hill shares were generally weak and unsettled. Yesterday Con. Virginia, under inside manipulation, set back to $1.60, closing the day at that figure bid, but Chollar sold up to 76 cents, with that figure bid at the close. Potosi was also stronger. The decline in Con. Virginia, which the street had been watching, created a feeling of demoralization, and caused many to throw shares out along the line, which were taken in by strong parties. With the advance in Chollar a slightly better feeling prevailed, though more or less mistrust prevails with the trading public. The points on the street are to the effect that Chollar is to have a small up—some placing the figure at over $1.50 a share largely on a short interest. Whether these reports are correct the writer has no way of verifying. The present showing in the works on the Brunswick lode justify better figures on merit without taking anything else into consideration.

The mining share market opened strong this morning for Chollar and Potosi, but the rest of the list was weak. After regular call, Chollar continued to show strength, when Con. Virginia began to advance, causing all to sell at better figures. At the 2:30 session Con. Virginia was easier, but Chollar was firmer. The advance in the latter is due to reports of an improvement on the 500-foot level Brunswick lode.

From the Comstock mines official letters report that in Utah they are still working east, with the material showing clay seams and narrow streaks of quartz. In Sierra Nevada the west crossdrift, Layton tunnel level, is in about 420 feet. The material is hard porphyry. In Union they have resumed work in the north lateral drift on the 900-foot level. The face at last advices was in porphyry. The south drift on the 1000-foot level of Mexican shows clay seams and narrow streaks of quartz, giving low assays. In Ophir a south drift has been started 41 feet above the Central tunnel level. This drift is following a narrow streak of ore from which two tons have been extracted, giving an assay value of $45.95. At last official advices they were easing timber on the 1000-foot level. In Con. Virginia fairly active exploiting is being done on the 1000-foot, 1550-foot and 1650-foot levels. The center of attraction is the work in the incline upraise from the 1650-foot level. At last official advices the opening still showed good grade ore of an average width of 4 feet. In a south drift they run into a foot of ore going about $40 to the ton, which is said to be the downward continuation of the ore found above. The total number of tons extracted was eighty-two, giving an assay value of over $58 to the ton. In Best & Belcher and Gould & Curry there is no change in work; neither is there in Savage. The official letter from Hale & Norcross reported that work was largely confined to needed repairs in the mines. In Andes, on the 175-foot level, the crossdrift passed through a quartz formation 11 feet in width, but was, at last advices, in soft porphyry. In Potosi they are still upraising from the tunnel level. Last letter received stated the top was in quartz going from $20 to $30 to the ton. They saved about forty tons, assaying over $34 to the ton. In Bullion they are still driving ahead the north drift. The total distance run is about 335 feet. They are driving ahead in the Alpha west crossdrift on the 500-fcot level. From the Gold Hill group of mines the news is practically unchanged in Con. Imperial, Confidence, Yellow Jacket, Kentuck, Crown Point, Belcher, Seg. Belcher, Overman and Caledonia. Belcher is extracting more ore, but Seg. Belcher and Overman are extracting about the same as heretofore reported. From Alta our advices do not differ essentially from that published last week.

From the Brunswick lode our advices state that Chollar continues to extract and sent to mill over thirty tons of ore a day. Last week the average battery assay was $19.65 gold and 16.57 ounces fine of silver to the ton. Active exploiting work is being done on the following levels: 200-foot, 300-foot, 400-foot and 500-foot. On the 600-foot level they are driving ahead on a south drift. In Occidental they are chiefly engaged on the 550-foot level in exploiting work. On the 650-foot level they are cleaning out a south drift so as to meet the winze going down from the 550-foot level. The joint work of Gould & Curry, Best & Belcher and Con. Virginia is confined to opening up of the 300-foot level and sinking shaft No. 2. On the 300-foot level they are running an east crossdrift. They have also resumed work in the south drift.

The following illustrates the changes of the week:

Mines.	May 13.	May 20.
Alpha	.....	.....
Alta Consolidated	.....	.....
Andes	$ 23	$ 18
Belcher	25	.....
Best & Belcher	58	61
Bodie	.....	.....
Bullion	.....	.....
Challenge	25	.....
Chollar	70	99
Confidence	.....	1 00
Consolidated California and Virginia	1 90	1 75
Consolidated New York	.....	.....
Crown Point	27	32
Exchequer	.....	.....
Gould & Curry	23	20
Hale & Norcross	.....	91
Justice	.....	.....
Mexican	.....	37
Ophir	95	91
Overman	15	.....
Potosi	49	60
Savage	12	30
Sierra Nevada	.....	42
Union	38	30
Utah	.....	.....
Yellow Jacket	27	30

San Francisco Stock Board Sales.

SAN FRANCISCO, May 20, 1897.

9:30 A. M. SESSION.

200 Andes	18	300 Ophir	85
200 Best & Belcher	53	100 Potosi	47
1150 Chollar	79	500 Savage	30
150 Con Cal & Va	1 65	600 Seg Belcher	09
100 Crown Point	21	100 Sierra Nevada	37
100 Mexican	32	100 Union	30

SECOND SESSION—2:30 P. M.

100 Ophir	91	300 H. & N	91
100 Mexican	37	400 Crown Point	32
50 Gould & Curry	20	300 Yellow Jacket	30
400 Best & Belcher	61	200 Sierra Nevada	42
350 Con Cal & Va	1 75	200 Seg Belcher	10
200 Chollar	99	200 Occidental	10
400 Potosi	60	100 Confidence	1 00

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied.	Delinq't and Sale.	Secretary.
Bullion M Co, Nev	50	10c	May 4.	June 8. June 28	R R Grayson, 331 Pine
Challenge Con M Co, Nev	23	10c	May 13.	June 16. July 8	C L McCoy, Mills Bldg
Chollar M Co, Nevada	43	15c	May 10.	June 15. July 8	C E Elliott, 309 Montgomery
Eureka Con D M Co, Cal	8	5c	Apr 2.	May 15. June 5	D M Kent, 330 Pine
Gould & Curry S M Co, Nev.	81	20c	Apr 29.	June 1. June 22.	Alfred K Durbrow, 309 Montgomery
Gray Eagle M Co, Cal	46	5c	Mar 30.	May 8. May 29	W J Gurnett, 308 Pine
Jamison M Co, Cal	9	5c	Nov 27.	Apr 24. June 19	Sam W Cheney, 120 Sutter
Marguerite G M & M Co, Cal.	6	10c	Apr 12.	May 24. June 21	F Mettmann, 237 Twelfth
Occidental Con M Co, Nev	27	10c	May 11.	June 12. July 1	Alfred K Durbrow, 309 Montgomery
Overman S M Co, Nev	77	10c	Apr 12.	May 17. June 7	Geo D Edwards, 414 California
Pine Hill G & S M Co, Cal	10	5c	May 10.	July 1. July 22	Chas A Hare, 1003 Railroad Ave
Savage M Co, Nev	92	20c	Apr 13.	May 17. June 7	E B Holmes, 309 Montgomery
Seg Belcher & Mides Con M Co, Nev	19	5c	Apr 6.	May 10. May 29	E B Holmes, 309 Montgomery
Sulphur Bank Q M Co, Cal	5	25c	Mar 23.	May 3. June 3	T Wintringham, 306 California
Tenabo M & M Co., Nev	1	50c	Mar 29.	May 4. May 24	T J Read, 606 Sutter
Thorpe M Co, Cal	6	2½c.	Apr 14.	May 22. June 13	A F Frey, Phelan Building
Union Con S M Co, Nev	54	20c	Apr 7.	May 11. June 1	A P Swain, 309 Montgomery

WILL NEGOTIATE with owners or their duly authorized agents only.

WILL INVESTIGATE only thoroughly bona-fide properties, either Mines, Prospects or Mineral Lands, whose owners are willing to make reasonable terms. When sending reports on properties also send terms on which you are willing to sell or lease.

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T. R. MILLER, Vice-Pres't. JOHN D. FLEMING, Counsel.

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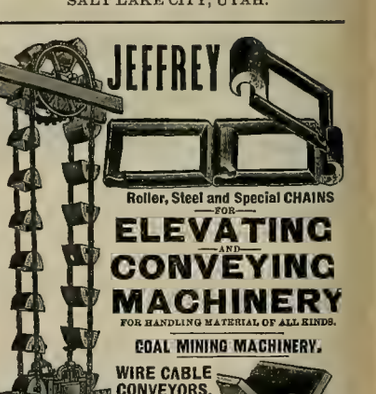
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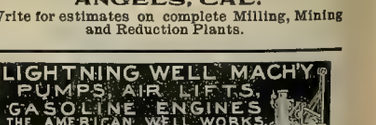
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List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MAY 11, 1897.

582,515.—HYDROCARBON BURNER—S. A. Barrett, San Bernardino, Cal.

582,576.—MUCILAGE BOTTLE—L. H. Bricker, Berkeley, Cal.

582,171.—WINDING APPARATUS—J. S. Brown, Berkeley, Cal.

582,577.—SOUNDING BOARD—A. Bruenn, Oakland, Cal.

582,412.—SPRING—H. O. Chase, S. F.

582,414.—CAR VENTILATOR—E. T. Earl, Oakland, Cal.

582,284.—ANNUNCIATOR—B. E. Harris, S. F.

582,304.—TRIPLE VALVE FOR BRAKES—J. G. Holcombe, Newport, Or.

582,305.—TRIPLE VALVE FOR BRAKES—J. G. Holcombe, Newport, Or.

582,220.—SNAP HOOK—A. B. McClory, Winters, Cal.

582,509.—CAN WASHING MACHINE—F. A. Seufert, The Dalles, Or.

582,318.—DUST COLLECTOR—Shaw & Scott, Woodburn, Ogn.

582,567.—SAW GUMMER—Winrod & Derrick, Gibsonville, Cal.

582,568.—PUMPING APPARATUS—J. Winter, Tulare, Cal.

27,011.—DESIGN FOR TOY—J. T. Quinn, Los Angeles, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

PUMPING APPARATUS.—John Winter, Tulare, Cal. No. 582,568. Dated May 11, 1897. This invention relates to a pumping mechanism. It consists essentially of a storage tank having a discharge pipe and a valve controlling said discharge, a vertically disposed stem, of a wheel contiguous to said tank having radially projecting spokes, connecting braces, buckets with arms fulcrumed between their ends to the outer extremities of the spokes, inclined cams on the connecting braces adapted to contact with the lower end of the valve stem and automatic upon the valve upon the alignment of a preceding bucket with the discharge bucket, and a fixed stop for acting against the free ends of the bucket arms, causing the bucket to tilt and discharge the contents. In connection with this device is a pump operated directly from the rotating wheel shaft and adapted to pump water up into the storage tank.

VENTILATED HAT. — James E. Goodman, Santa Rosa, Cal. No. 581,857. Dated May 4, 1897. This invention relates to hats provided with ventilating devices. The object is to provide a simple means for ventilating and controlling the ventilating devices. It consists of a crown which is circumferentially severed, the upper section held apart and supported above the lower section by fixed standards at intervals so that a circumscribing or annular opening is made in the crown of the hat above the brim, a flap secured around the upper section of the crown falling over the circumscribing opening, having its lower edge free, with means for moving the lower edge to and from the lower section of the hat crown in order to close and open the passage, the means consisting of hangers and expansible and contractible rim wire with an attachment by which it can be easily operated.

Rainfall and Temperature.

The following data for the week ending 5 A. M., May 19, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week.....	Total Seasonal Rainfall to Date.....	Total Seasonal Rainfall Last Year to Same Date.....	Average Seasonal Rainfall to Date.....	Minimum Temperature for the Week.....	Maximum Temperature for the Week.....
Eureka	.00	49.46	50.78	44.08	46	64
Red Bluff	.02	24.12	31.74	25.19	54	98
Sacramento	.30	17.28	22.67	20.44	51	85
San Francisco	.61	23.32	20.84	23.54	49	71
Fresno	.00	10.53	8.16	7.19	52	94
San Luis Obispo	.04	20.74	17.64	....	48	78
Los Angeles	.05	16.85	9.35	19.61	52	74
San Diego	.02	11.69	5.92	10.36	54	66
Yuma	.00	5.35	.88	2.97	62	100

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WANTED.—BY A PRACTICAL MINER, position as superintendent or foreman of quartz mine. Understands timbering, assaying, surveying, and how to make a mine pay if there is any pay in it. Address J, this office

Assessment Notices.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 2) of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office: Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 24th day of February, 1897 will be delinquent and advertised for sale at public auction, and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 26th day of March, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on SATURDAY, the 24th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 19th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of April, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on MONDAY, the 24th day of May, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 19th day of July, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

GOULD & CURRY SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of April, 1897, an assessment (No. 81) of 20 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 69, Nevada Block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of June, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 22d day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room 69, Nevada Block, No. 309 Montgomery street, San Francisco, California.

CHALLENGE CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Gold Hill, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the 13th day of May, 1897, an assessment (No. 23) of Ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, room 35, third floor, Mills building, corner Bush and Montgomery streets, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 16th day of June, 1897, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 8th day of July, 1897, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

C. L. McCOY, Secretary.

Office—Room 35, third floor, Mills building, San Francisco, California.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Silver Star Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 11th day of May, 1897, an assessment (No. 27) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of June, 1897, will be delinquent, and advertised for sale at public auction, and, unless payment is made before, will be sold on THURSDAY, the 1st day of July, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from the Industrial Gold Mining Co., in the Old French Mine near Indian Diggins, El Dorado Co., to deposit tailings in Cedar Creek; from James Rooks, in the Messerer Mine near Spanish Ranch, Plumas Co., to deposit tailings in Spanish Creek; from the Haskel Ravine Mining Co., in its mine in Mohawk Valley, Sierra Co., to deposit tailings on a flat; and from Costa, Davis & Co., in their mine at Cherokee, Butte Co., to deposit tailings in an old pit; gives notice that a meeting will be held at room 69, Flood Building, San Francisco, Cal., on May 24, 1897, at 1:30 P. M.

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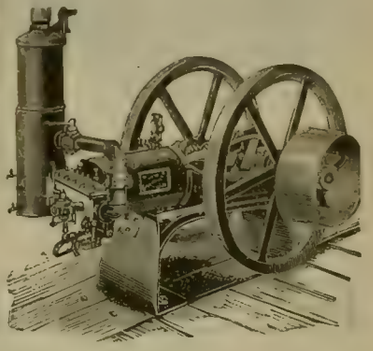
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We guarantee our Engines to work perfectly on California Crude Oil, or Distillate, or any other kind of gaseous Oil; we however prefer CALIFORNIA CRUDE OIL, from Coalinga, Fresno county, for the reason that gas from Crude Oil will produce more power from the number of feet of gas used than from any other Oil, and it is also a natural lubricant as well, the valves being always lubricated sufficiently to prevent them from sticking, thus assuring greater durability of the working parts than it otherwise would be in using dry gas. And another advantage we claim is, that danger from explosions is reduced to a minimum, there being no accumulation of gas, but is used by the Engine as fast as it is generated and hence is absolutely safe. The following is a test that we made with one of our Five-Horse Power Crude Oil Engines, running ten hours on the different gas oils:

California Crude Oil, 40 grav.,	2½	gals. at	5c.,	$.37½
Distillate	40	"	8c.,	.60
Domestic Coal Oil	40	"	12½c.	.93¾
Gasoline	14	"	15c.,	1.31½
City Gas	1000	feet,		2.00

We manufacture all sizes from two-horse power up, and will guarantee that our Engines will run cheaper and are more simple in construction, have fewer parts and hence are more durable than any other Gas Engines on the market. Seeing is believing—don't take our word for it, but come and investigate for yourselves. You can always see one in operation at our works. We will be pleased to see you and will at all times take pleasure in showing them up. Our Engines are specially adapted for running well and mining machinery—in fact, for any kind of power desired. We are the pioneers and first inventors of Crude Oil and Distillate Engines. **We always lead and never follow.** Send for Catalogue and Price List of the only genuine Crude Oil and Distillate Engine made.

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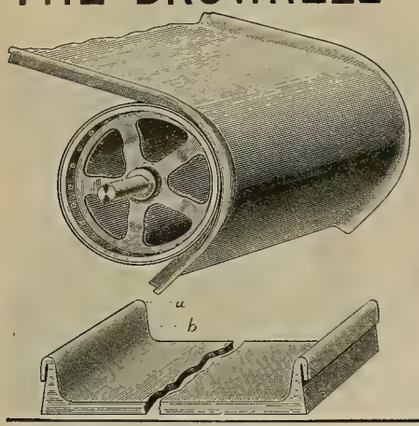


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RAWHIDE GOLD MINING COMPANY,
JAMESTOWN, TUOLUMNE CO., CAL., Feb. 21, 1897.

J. S. BROWNELL, ESQ.—DEAR SIR: Replying to your query of Feb. 15th, will say that I have used your Patent Lip flange belt more than one year, and judging from their appearance after more than one year of hard service, I do not hesitate to say that they are the best belt I have ever used and I take great pleasure in testifying to the fact. Yours truly, W. A. NEVILLS, President.

AMADOR CITY, CAL., Feb. 18, 1897.

MR. J. S. BROWNELL—DEAR SIR: I take pleasure in saying that I have used your Patent Lipped flange belt for several years while connected with this company, and I consider them the best that we have used. The quality of rubber in the flange seems to be the best, and we are not bothered with the flange cracking and thereby destroying the life of the belt. At present we are using 14 concentrators, and have in use several kinds of belts. We consider your Patent Lipped flange the best. Yours very truly, THE CONS. SOUTH SPRING HILL G. M. CO.
By JOHN R. TREGLOAN, Superintendent.

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JAS. S. BROWNELL, Western Agent FRUE VANNING MACHINE CO.

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RISDON IRON WORKS,

Office and Works: Cor. Beale and Howard Sts., San Francisco.

READ WHAT MINERS THINK OF THE BRYAN PATENT ROLLER QUARTZ MILL AND JOHNSTON CONCENTRATOR.

OFFICE OF THE CANDELARIA CONSOLIDATED MEXICAN MINING CO.,
SAN DIMAS, DURANGO, MEXICO, October 25, 1888.

RISDON IRON WORKS, San Francisco—Gentlemen: Our company has been operating three of the 4-foot Bryan Roller Quartz Mills, one of which has been running steadily for three years, one for two and one for one year. Our quartz is very hard; we crush through a No. 60 mesh screen. Our mills run 55 revolutions per minute, and each crush through 60-mesh screens 12 tons in 24 hours; through 50-mesh, 15 tons; and through 40 mesh, 18 tons. This proportion has been continuous.

One set of dies will crush from 1500 to 1600 tons.
One set of tires will crush 1500 tons.
One ring plate will crush from 2200 to 2300 tons.

The mills require very little attention. At our mill an ordinary "peon," earning one dollar per day, has complete charge.

In regard to slimeing, in comparison with stamps, by reason of the discharge surface and the continuous agitation by the scrapers, a MUCH less amount of slime is created. A three years' experience teaches me that, in every respect, the mills are a complete success, and of material benefit to the mining world. They can be set up and running in forty-eight hours and can be dismounted in the same time and removed to wherever desired. Ours were packed on our mule trail over as difficult a road as any in Mexico. As a gold amalgamator it is unequaled by any mill now in existence. Yours truly,
D. M. BURNS, Superintendent.

BULLION-BECK AND CHAMPION MINING COMPANY,
EUREKA, UTAH, August 24, 1895.

THE RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: Referring to contract made by you with the Bullion-Beck and Champion Mining Company, by which you were to furnish one 5-foot Bryan Roller Quartz Mill on four months' trial, in competition with the Huntington Mill, would say that we have made the test, and the Bryan Mill has proven so greatly superior on all points claimed, viz., capacity and economy, that we have ordered a second Bryan Mill from you and have concluded to discontinue the use of the Huntington Mill.

Yours truly, JOHN BECK, Pres.
SIMON BAMBERGER, Director. [Copy.] W. J. BEATIE, Sec't'y.

BULLION-BECK AND CHAMPION MINING COMPANY,
EUREKA, UTAH, Aug. 24, 1895.

THE RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: In February last, in connection with the five-foot Bryan Roller Mill which we took from you to test in competition with the Huntington Mill, we also took a six-foot Johnston Concentrator to be tested with ten Frues, one end shake with four belts and one side shake Woodbury. We have been working these machines since the mill was completed, at such times when we had sufficient water.

The terms on which the test was made was that the machine doing the most satisfactory work should be accepted and the others taken out. This did not apply to the Frue, as they were purchased with the plant. In compliance with this agreement, we now inform you that the Johnston Concentrator has proved so superior over the other machines that we now order from you four more of the Johnston Concentrators. Yours truly, JOHN BECK, Pres.
SIMON BAMBERGER, Director. W. J. BEATIE, Sec't'y.

GREAT SALT LAKE AND HOT SPRINGS RAILWAY,
S. BAMBERGER, President and Manager.
SALT LAKE CITY, UTAH, October 10, 1895.

B. R. TAWNDRAW, ESQ., care Guyer Hot Springs, Ketchum, Idaho—Dear Sir: In reply to yours of the twenty-eighth of September, we have been using at the Bullion-Beck Concentrating Works, Frue Vanner, Woodbury and Johnston machines, side by side for the last four months; and after a thorough trial of all of them, we concluded that the Johnston Vanner was doing the most accurate work and was the best; hence, we bought four more Johnston machines and shall continue to use them in preference to any other.

You will find it the easiest regulated machine and very much easier set up than either of the other machines. We bought our machines from the Risdon Iron Works, of San Francisco, where Mr. Johnston, the patentee, personally superintends the manufacturing of them.

Hoping you will make a success, I remain, Yours truly,
[Copy.] [Signed] SIMON BAMBERGER.

THE GOLD VALLEY MINING COMPANY OF SAN FRANCISCO,
C. C. McIVER, President; D. CUSHMAN, Secretary.
MISSION SAN JOSE, CAL., Oct. 17th, 1895.

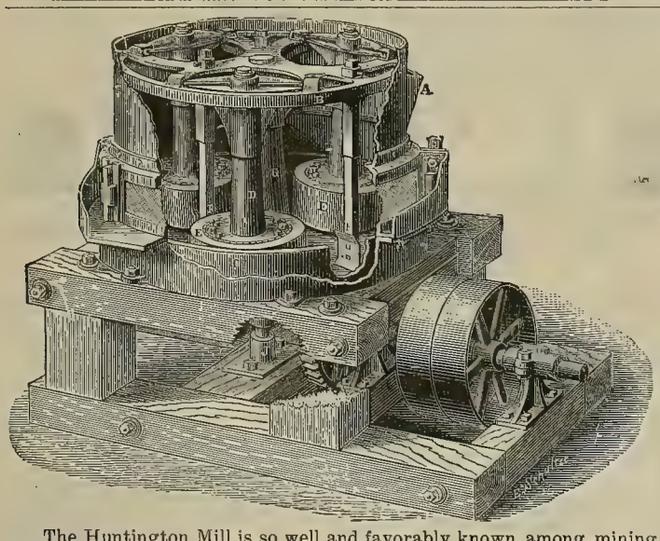
RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: We take great pleasure in having to inform you that, after a careful investigation extending over a six weeks' steady run alongside of six other concentrators, the Johnston which you put in for us was the only machine from which you could not find a loss in the tailings. It has done all you claim for it and has proved more than satisfactory. We intend replacing all our other concentrators with Johnston's, as we are convinced they will pay for themselves many times over in a year. CHAS. C. McIVER, President.

Fulton Engineering and Shipbuilding Works.

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The Huntington Mill is so well and favorably known among mining men throughout the world that any description of it would seem superfluous. They are in use in the United States, Canada, Mexico, Central and South America, Australia, China, Japan and South Africa—in fact, wherever mines exist, and have given the best satisfaction of all quartz-crushing mills. The construction of this Mill has lately been much improved and we claim it to be the cheapest, most efficient, simplest and most durable Mill upon the market. Catalogue upon application.

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No. 1925.—VOLUME LXXIV. Number 22. SAN FRANCISCO, SATURDAY, MAY 29, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

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A Duty on Onyx.

An effort is being made in Washington by representatives of the onyx industry in California to have a duty put upon the importation of that article from foreign countries, most of which comes from Mexico. It is claimed that the markets of the United States are closed to the owners of deposits in this State by the Mexican product worked by very cheap labor, and but for that the demand could easily be supplied from here. There is an increasing demand for onyx for fine buildings, and this will be supplied from Mexico unless something is done by Congress to enable the people of this State to compete. Were there any question as to the quality of onyx found here a reasonable objection might be made to placing a duty on the Mexican product, but in fact finer qualities of onyx and of many varieties are to be found in this State. With a small duty—enough to cover the difference between the price of labor in California and Mexico—the onyx from this State would immediately find a large market in the Eastern States. Otherwise the owners of the deposits must wait for a local demand, which, of course, will hardly ever be commensurate with the supply.

The amount of onyx produced in California in 1896 was only 3000 cubic feet, valued at $24,000. The only onyx deposits in the United States, of extent and value, are those of this State. At the Chicago Exposition a display of samples of onyx was made that were then regarded by the judges as of the finest quality, yet no market has been opened for it nor can one be until better prices can be obtained in the East.

A large proportion of the onyx produced last year came from the quarries in San Luis Obispo county, where there are extensive deposits two layers thick. Most of that produced has been remarkable for its beauty. In Sonoma county, near Healdsburg, is a deposit of green aragonite that has in the past been quarried for ornamental purposes. The scene of this quarry is illustrated on this page. In Yolo and Mendocino counties onyx has been quarried for ornamental purposes, and there are many outcrops in other parts of the State that, owing to their remoteness from cheap transportation, have not been developed.

In Mono county is the so-called travertine, or banded onyx, like the famous Egyptian marble. These deposits are of great extent and the product is of such beauty that it commands high prices. It is as fine as any that comes from the regions of the Nile. Lately some Eastern capitalists have been investigating these deposits with a view to purchasing them and shipping the product to the East. What they will determine is likely to depend upon whether a duty is put upon the article or not. The entrance hall of the new Claus Spreckels building is to be finished with the travertine. The use of wood for ornaments in fine buildings and houses is going out and the demand for these finer stones is increasing.



CALIFORNIA ONYX, NEAR HEALDSBURG.

Mineral Paint.

The production of different mineral paints in California in 1895 was 850 tons, valued at $8425. In 1896 it fell off to 395 tons, valued at $5540. In the latter year only one mineral paint mine was worked—that near Healdsburg, in Sonoma county, whose works are illustrated on this page. This product is the so-called Indian metallic red paint. The ore body, consisting of hematite and silicate of iron, is 60 feet in width and the mill has a capacity of grinding eight tons a day. After a superficial sorting the ore is crushed and passes to an iron drying drum, heated by a wood fire, which revolves at a slight inclination; thence to the self-feeders of an ordinary 10 stamp mill; thence the dry pulp passes through a coarse bolting cloth and the residue is thrown away. That which passes through the bolting cloth is ground between three sets of French burr-stones, and between each set is passed through the finest bolting cloth. Finally, it is passed between iron rollers, one running faster than the other, to give a sliding motion, and packed in paper-lined barrels. For a darker color, the ore is mixed in the batteries with a black, carbonaceous shale.



MINERAL PAINT WORKS NEAR HEALDSBURG, CAL.

There has been mined some mineral paint in Tehama county, in Calaveras and in Nevada. In fact, the State is full of paint mines, but none can be made to pay except this one in Sonoma on account of freight.

Most of the mineral paint used in California is brought from the East around the Horn, and as it comes as ballast the freight is trifling. Until local rates of freight are much lower than at present, and the local demand will enable the working of it in large quantities, there is not apt to be much increase in the output.

However, the deposits of mineral paint, like the deposits of chrome ore, of onyx and other of the more valuable building stones, cinnabar, and other minerals, will all in time add to the wealth of the State, when its population has increased and costs of production and transportation have been reduced.

Reviving Abandoned Mines.

A report comes from Grass Valley, California, that the old Cariboo ledge in the Allison Ranch mine has been uncovered and rich ore found. While probably not enough has been developed to entirely satisfy the owners that the mine will turn out as rich as it was many years ago, no doubt they would quickly refuse the prices lately offered for it by foreign investors if they were again placed before them. There have been a great many mistakes made by foreigners in this State of late—not so much in taking hold of poor properties and losing money, but in refusing to buy good mines at the prices asked—mines which have turned out worth much more than the prices placed on them.

Most of the big paying properties in this State today are old mines which were abandoned for many years. The California miners have learned that with the reduced cost of working these mines in which old ore bodies are known to exist, but are covered with water, are the safest investment and are putting money into them. The Englishman cannot so easily be led into putting money into what has been a failure and has not yet learned that the cause of the failures has been in most cases higher wages, heavier freights, greater cost for supplies and smaller percentage of gold saved in the days gone by. Some of the leading mines of the State—the Utica, Kennedy, Gwin, Dead Horse, and many of the big mines in Nevada county—have all been abandoned for a time, not from want of ore but because of cost of working.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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J. F. HALLORAN.....General Manager

TO THE PUBLIC.

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San Francisco, May 29, 1897.

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The Mining Bureau and Motive Power.

The State Mineralogist has announced his intention to gather and publish data as to the available water power in the State for generating electricity and similar purposes. This is timely. At present there are in this State two transmission plants, each longer than any other in the world outside of California—that at Bakersfield being thirty-five miles long and the Fresno line thirty-two miles. The Folsom plant, to transmit power twenty-two miles from Folsom dam to the city of Sacramento, was the first great success in transmission of large power a long distance.

Another large undertaking is that of the Blue Lakes Company, to supply the mines of Amador and Calaveras with power. A number of other such plants are being considered for supplying the mines of Mariposa and other districts. It is claimed that, until power is brought from the Kern river to the mines in the Rand district, in Kern county, a distance of thirty-five miles, the question of cheap milling and mining for that district will not be solved. There is talk of similar plants on the Colorado river and in other parts of the arid districts in southern California.

Whether these undertakings will be carried out or not depends entirely upon whether the showing that shall be made in the mines will warrant their being worked extensively.

The Southern Pacific people have been for some time examining into the question of running their trains over the mountains in northern California and southern Oregon, and over the Sierras between Sacramento and Reno, by electric power generated with water from the torrential streams along the two roads. It is not likely that anything will be done until more is heard from the experiments on Eastern railroads looking toward supplanting the locomotives by electricity with the third rail system.

There is probably no other part of the world so well supplied with torrential mountain streams, available for the generation of electric power, as is California. More than that, the climatic and other conditions are favorable to inexpensive installation and economic working the year round. Then, when the time comes for the State to do much manufaacturing, it will have another advantage over most of the rest of the country in respect to climate. Rigors of winter and heat of summer will not prevent obtaining good work from laborers, as well as machinery, the year round.

Probably, as to mining, in no direction will the use of electricity play so important a part as in prospecting and developing new mines. It is proposed now to carry electric power into Amador, Calaveras, Tuolumne and Mariposa counties in the near future and sell to the individual mine owners. This will result in the exploiting of many mines now idle and upon which the owners cannot or do not wish to go to the heavy expense that would be entailed in setting up independent power plants. Aside from giving an impetus to mining, the installation of large power plants in the foothills will lead to the building of railroads and in time factories. Probably in no other direction could work be done by the State Mining Bureau at the present time that would be of more value, not only to the mining industry but to the State at large, than in making a thorough examination into the possibilities of developing this resource of wealth.

The New Move of the Anti-Debris Association.

In his remarks before the executive committee of the California Miners' Association, last Tuesday evening, Tirey L. Ford brought out quite clearly some facts that are specially interesting at this time. He recalled the fact that the valley people at all times disclaimed any desire or intention to interfere, by injunction or otherwise, with any kind or character of mining other than hydraulic mining. During the years of fiercest conflict between valley and mountain this disclaimer was repeated with much frequency and seeming earnestness. This declared attitude of the valley people was finally accepted in good faith by the miners of the mountains, though there were not wanting a few who doubted the sincerity of the valley declaration. It was argued by these doubting few that the evident purpose of the valley people was to attack one branch of mining at a time, and, by creating a sense of security as to all other branches, make the particular branch attacked more easy of successful assault. These skeptics further predicted that when one branch of mining had been thus successfully assailed, other branches of mining would, in their turn, become the object of attack, and that this process would continue until the entire mining industry had been so crippled that its further prosecution would become altogether too hazardous to warrant the further investment of capital therein. This view, however, was not shared by the great body of miners in the mountains, the feeling there being that the valley people were sincere and desired no more than the suppression or, at least, a proper regulation and control of the hydraulic branch of the mining industry.

Upon this basis an armistice was declared, and in January, 1892, the mountain and valley men met in Pioneer Hall in this city and mapped out a mutually satisfactory plan for the settlement of the differences that had so long kept the two sections apart. Pursuant to this plan, Congress was persuaded to pass an act for the regulation and control of hydraulic mining, such regulation and control to be in the hands of a commission composed of U. S. Army engineers. This involved some concessions upon both sides, but it was believed that mutual advantage would result. It placed hydraulic mining where the valley farmer would feel safe as to its proper regulation and control, thus accomplishing all he had ever sought to accomplish, and without expense to the valley people. On the other hand, the miner, though feeling that the act of Congress (known as the Caminetti act) was rather severe, not to say burdensome, in its restrictions and regulations, still felt that the matter was, at least, in the hands of an impartial tribunal and that his rights were definitely and finally settled and prescribed.

An era of good feeling thereupon set in, the terms of peace being fairly and substantially respected in both mountain and valley. The miners set to work to secure such State and national legislation as would more fully carry out the terms of the Caminetti act, including the needed appropriations to be expended by the U. S. engineers under the provisions of that act. The farmers also sought legislative aid, in the procurement of which they had the hearty co-operation of the miners. This was notably the case in the recent session of our State Legislature when the representatives from the mountains and from the valleys worked hand in hand and in perfect harmony. In fact, without the active aid of the mining representatives the appropriation of $300,000 for river improvement and rectification would have wholly failed.

It is, therefore, the occasion of some surprise, and of still more regret, that the Anti-Debris Association should now seek to attack another branch of the mining industry, and thus give rise to some suspicion as to their former good faith in disclaiming any hostility to any branch of mining save hydraulic mining alone. The great problem that had long confronted the two sections above referred to seemed in a fair way of an early and honorable solution, and the increasing harmony and good will between farmer and miner was effectually hastening that desirable result. But, just as matters were in this happy condition, just as the miners and farmers were about to make a joint appeal to Congress for the necessary means to carry out their concerted plan of action, there came the unwelcome news that the Anti-Debris Association had departed from its declared purpose of restricting its operations to hydraulic mining. This news should be as unwelcome in the valley as in the mountains, for it is clear that without united action no lasting or substantial benefits can follow. Once let the terms of peace be broken and war again declared, and we may bid a long farewell to all further hope for Congressional aid, without which any proper or permanent solution of the grave problems now engaging the earnest attention of both farmers and miners will be indefinitely, if not hopelessly, delayed.

The above is written in no unfriendly spirit toward the farmer, but rather in a spirit of friendship to both farmer and miner, and with a hope that the valley people may see that any slight or temporary gain that might result from the methods newly employed by their Anti-Debris Association would be wholly lost and swallowed up by the strife and disaster that would be sure to follow. Let the Caminetti act be the arbiter of our differences and the California Debris Commission the tribunal before whom all grievances shall be laid; let every energy be bent to securing national aid for the improvement and protection of our rivers under the direction of Federal engineers, and we may rest assured that the results to be thus obtained will be all that either farmer or miner could desire, and more than either could accomplish without the aid of the other.

It seems the purpose of the Anti-Debris Association, as indicated by some of their procedures, to attempt to have all sluicing of gravel brought under application of the Caminetti act. The Caminetti act in Section 8 states: "That for the purpose of this act 'hydraulic mining' and 'mining by the hydraulic process' are hereby declared to have the meaning and application to said terms in said State." This act was approved March 1, 1893. The Legislature of California adopted as sections of the code, which were approved March 24, 1893, the following:

SEC. 1424. The business of hydraulic mining may be carried on within the State of California wherever and whenever the same can be carried on without material injury to the navigable streams or the lands adjacent thereto.

SEC. 1425. Hydraulic mining, within the meaning of this title, is mining by means of the application of water under pressure through a nozzle against a natural bank.

The California Debris Commission has taken this definition as accepted by the act of Congress of March 1, 1893—the Caminetti act. The Anti-Debris Association claims that the above quoted sections of the code having been passed later than the Caminetti act, can have no bearing upon it. That "hydraulic mining" and "mining by the hydraulic process" in "the meaning and application given to said terms in said State (California)" refers only to the washing of gravel by the "application of water under pressure, through a nozzle, against a natural bank," can be proven. Take Bowie's "Practical Treatise on Hydraulic Mining." On page 84 the definition is given as follows: "Hydraulic mining is that method of gold mining in which the ground is excavated by means of water discharged against it under pressure (hydraulicked)."

For all other classes of mining gravel with water, such as "sluicing," "booming," other terms are and have always been used.

Concentrates.

A 20-TON cyanide plant is to be erected at Pony, Montana.

OREGON'S gold output for '96 aggregated a little over $2,000,000.

IN Riverside, Cal., twelve mining location notices were filed in one day last week.

THE establishment of a mining stock exchange in Portland, Or., is being talked of.

THE Junction mine, Nevada county, Cal., has been bonded to San Francisco men for $12,000.

A RICH strike is reported in the 1400-foot level of the Dead Horse mine, in Tuolumne county.

NEW YORK people have bonded the Franklin mine, near Washington, Nevada county, Cal.

RICH ore was struck last week in the North Star mine, Nevada Co., Cal., on the 700-foot level.

AT the Cadmus mine, at Nevada City, Cal., instead of firing the blasts by hand this is done by electricity.

SQUAWS near Bodie, Cal., earn considerable money by pounding rock up in a mortar and horning out the gold.

THE Rossland, B. C., Mining Stock Exchange's members have decided to disincorporate and close its doors.

A COMPANY with a capital of £2,000,000 is being formed in London to acquire the Jumbo mine in British Columbia.

A LINE of stages has been put on the road between Baker City, Or., and the Seven Devils copper district in Idaho.

THE Canadian Government at Ottawa has been urged to put an export duty on lead ores, but will probably not do so.

THE 10-stamp mill at the Cleveland mine, Sierra City, Cal., was destroyed by fire last week. The owners will rebuild.

THE State Commissioner of Mines of Colorado has begun to prepare a report on the mines and prospects of Cripple Creek.

THE tailings of several old mines at Cherry Creek, White Pine county, Nevada, have been purchased by Salt Lake City people for 25 cents per ton.

AN amendment to the Mineral act passed by the Legislature of British Columbia provides that the cost of surveying a claim up to $100 may be counted as assessment work.

THE Canadian Pacific Exploration Company has been formed in London, with a capital of £500,000, to operate in British Columbia.

AT the Iron Mountain mine, in Shasta, last Saturday, five miners were buried by a cave, one being killed and the others more or less injured.

IT is estimated that there are 200 teams hauling machinery and supplies from the railroad depot to Sonora, Tuolumne county, for the mines.

AN English syndicate is negotiating for the purchase of the Reco mine at Sandon, B. C., for which it is reported they have offered $2,500,000.

TELEPHONE LINES are being constructed and will connect Spokane with Rossland, Trail and other points in British Columbia in a few days.

SILVANITE, in the Yakh district, Montana, where was only a log cabin a year ago, now has a population of 300, owing to the discovery of gold mines.

THE gold exported from British Guiana from January 1 to April 12, 1897, was valued at $432,915, against $417,054 for the corresponding period of 1896.

A COMPANY has been bought out in London with a capital of £80,000 to take ore and work a copper property near Ario, State of Michoacan, Mexico.

THE Mountain Copper Company at Keswick has ordered 2,000,000 feet of lumber from Sisson, Cal., and will erect forty-five new cottages for the workmen.

THE Todos Santos gold mine in the San Jose de Gracia district, Sinaloa, Mexico, has been purchased by the Anglo-Mexican Mining Company, Limited, for $82,000.

PROSPECTORS are preparing to go on the Cuyamaca grant in San Diego county, Cal., the owners having made offers to any who may discover mineral in paying quantities.

A FACTORY for making fire brick has been started at Great Falls, Montana, where a good quality of clay is found. Montana consumes about 10,000,000 fire brick per year.

ON Coffee creek, Trinity county, Cal., the Graves Brothers with a 10-inch stream in one week lately washed out 249 ounces of coarse gold, the largest piece being worth $250.

B. A. CARDWELL has begun the construction of a wagon road from Truckee, California, to the Meadow Lake mines, and expects to have it completed by the middle of June.

THE volcano of Popocatepti is bonded to an American syndicate, the object being to exploit for sulphur, bring ice and wood to the City of Mexico and carry tourists up to the crater.

OF the many proposed smelters for British Columbia work has only been begun on one—that at Victoria. All the details as to location and plans have been accepted and some contracts let.

AT a joint meeting of the Chamber and the Association of Mines on the Rand, South Africa, April 28, it was resolved to reduce native wages 30 per cent. This will bring the average down to about $7 a month.

A LARGE bed of auriferous gravel has been opened up near Offenbanya, in Transylvania. These alluvial deposits appear to have been known to the Romans, as adits driven by hammer and wedge have been found.

THE question as to location of a smelter for Trail creek ores depends largely on the place where coke may be obtained cheapest. The price at Northport, Washington, is $10 per ton, at Rossland $14, and at Trail $12.

A MOTION last Wednesday in the U. S. Senate to reduce the rate on boracic acid from four to three cents per pound in the forthcoming tariff bill was defeated by a vote of 34 to 20, being the first test vote on the measure.

THE Duquesne G. & S. M. & M. Co., has bought "the old Mexican mines," two miles from Escondido, San Diego county, Cal., paying, it is said, $100,000 therefor. Considerable development work will be done by Supt. Little.

AT a meeting of the members of the Spokane, Wash., Mining Stock Exchange a motion to disincorporate was lost by a vote of 8 to 13; but those in favor claim that a majority of all the members are in favor of the movement.

A CASE involving conflicting interests between the miners and farmers of the Carson valley, Nevada, was decided by Judge Hawley this week, giving judgment to the mining and milling company for 6000 inches of water, except in July, August and September, when the ranchers should have what they needed for irrigation, and for domestic use the year round—a conclusion satisfactory to both sides.

A COMPANY has been formed in Alaska to mine garnets near Wrangel. These garnets are noted for their size, being as much as 1¾ inches in diameter. Several thousand tons are annually used in this country for abrasive purposes.

THE exports of copper from this country lately have been large and outstrip the production. As a consequence prices are higher, reaching 11 cents a pound for Lake Superior copper, against 10¼c at the corresponding period of last year.

THE Mercur mine at Mercur, Utah, was closed down last Saturday in order to allow putting in the new machinery with which the output will be increased to 300 tons daily. Efforts of foreign capitalists to secure control have been resumed.

A DEAL is being negotiated in Colorado between a syndicate of English investors in Cripple Creek and Victor mines and the Colorado Midland and Midland Terminal, which will give them central shipping facilities from the camps to the East.

A PRESS DISPATCH from Deadwood, South Dakota, states that the Pierre syndicate has purchased thirty-five claims and several fractions adjacent to Lead City, and that it is their intention to erect a 200-stamp mill on Belle Fourche river.

S. R. PORTER, the superintendent, reports that at the Baliol mine, at Sutter Creek, Amador county, Cal., in April, the 40-stamp mill crushed 5885 tons of ore, at a cost of 60 cents per ton for mining and milling. It was delivered in the mill at 33 cents a ton.

AT the Black Oak mine, in Tuolumne county, the cyanide plant lately put in is found to be saving over 90 per cent of the assay value of the tailings, and the manager is about to take up the treatment of the hydrated ores and concentrates, and treat them.

THE Senate Committee on Public Lands has decided to report favorably Senator Perkins' bill for the examination and classification of the mineral lands within the railroad grants in California. It is thought this measure will pass before the tariff bill does.

THE gold output of Tasmania for the three months ending in March amounted to 13,822 ounces, being a decrease of 730 ounces as compared with the corresponding period of last year. That of Queensland for the same period was 167,500 ounces, an increase of 19,800.

UNDER the new mining law of British Columbia companies that have been operating under miners' licenses which have cost $5 per annum must by June 30 take out new licenses, which will cost $50 where the nominal capital does not exceed $50,000 and $100 where it does.

IN the early days of the Vulture mine, in Arizona, only the highest grade ore was milled. The present office building and storeroom was built of ore valued at about $50 a ton. The old assay office building was torn down several years ago and the walls milled, yielding about $2000.

JAMES BRAYELL, an old Comstock miner, has interested an English syndicate in his plan of exploration in British Columbia, and last Sunday left San Francisco with 150 men—experienced miners. They will be divided into prospecting parties, covering the unprospected country of the North.

THE shipments of ore from Rossland, B. C., mines for the week ending May 22 amounted to 1248 tons, made up as follows: Le Roi, 855; War Eagle, 250; Iron Mask, 143. The O. K. milled 141 tons. This makes the total of the shipments from Rossland since January 1, 22,258, and of ore milled 2261 tons.

IT is suggested by the Eureka, Utah, *Democrat* that now that the smelters have increased their charges, the railroads raised their rates for shipping ore, the price of powder increased 40 per cent., and there is imminent danger of the mills and low grade mines closing, the thing to do is to build a smelter in Tintic.

THE gold yield of Victoria, Australia, for March amounted to 83,440 ounces. The following are the returns for the three months ending March 31st: Ararat, 5530 ounces; Ballarat, 40,649 ounces; Beechworth, 25,780 ounces; Castlemaine, 11,700 ounces; Gippsland, 24,600 ounces; Mayborough, 14,622 ounces; Bendigo, 43,013 ounces. The quarter's dividends amounted to £98,500.

TAKING a list of forty-three of the principal mines of Cripple Creek, Colorado, the Colorado Springs *Mining Investor* shows that the stocks sold at the rate of $18,884,758 for the whole December 31, 1895, and May 17, 1897, the same stocks sold at a rate of $5,760,021 for the whole. In the meantime, the output of the Cripple Creek mines has increased from about $750,000 a month to over $1,000,000 per month.

THE American Flat Development Company of Virginia City, Nevada, is asking the owners of claims in American Flat to enter into a contract by which the company agrees to cut the tunnel 8000 feet in length, 8 feet wide and 7 feet high, provided the mine owners will deed over undivided two-thirds interests in their claims. It is understood that the tunnel company will then work the mines and turn over one-third of the net proceeds to the mine owners.

THE Broken Hill Proprietary mine of Australia reports on April 30 that 28,733 tons of ore were treated for the four weeks ending April 29, and the output from the refinery was 461,462 ounces silver, 1841 tons lead, 51 tons antimonial lead (estimated), the copper matte containing 26 tons copper (estimated) and 27,298 ounces silver (estimated). Owing to a portion of the plant being required for other purposes, the cleanup of gold will not be made until next month.

THERE were in operation last year in Alaska 549 stamps, as follows: Alaska Commercial Company, 40; Alaska-Mexican Gold Mining Company, 120; Alaska-Treadwell Gold Mining Company, 240; Alaska-Willoughby Gold Mining Company, 10; Bald Eagle Mining Company, 4; Berner's Bay Mining Company, 40; Ebner Gold Mining Company, 10; Green mine, Norton sound, 10; Julian Gold Mining Company, 10; Juneau Gold Mining Company, 30; Nowell Gold Mining Company, 35. This number will be increased about 40 per cent this year.

THE following data as to the cost of asphalt from the island of Trinidad placed in New York, as reported by Consul Price, will be of interest to the California asphalt mine owners: Crude asphalt is sold on the island of Trinidad for $4 per ton; digging, overlooking and cleaning and carting, 90 cents; loading lighters and ships, 30 cents; lighterage from shore to ship, 50 cents; contractor's profits, mercantile commission and all other expenses and losses, $1.10; export duty, $1.20; freight and insurance to New York, $2.25; total cost per ton, $10.25.

WITH the advance of cost of transportation, smelting charges and price of powder, there has been a great shrinking in the bullion market in Utah. In the Tintic district over 100 miners have been laid off by various mine owners. It is claimed by some that the smelter trust, on which work was commenced about six months ago, has been finally arranged, and that the proof had been afforded by the recent advance in smelting charges, which had gone all down the line. It is suggested by a prominent shipper that the only way in which to meet the advance was co-operation among the producers and the erection of a co-operative smelter.

IN the Gold Dust mine at Mercur, Utah, recently the shaft in the lower workings passed through nine feet of pay ore and stopped at a stratum of lime, supposed to be the footwall. Last week it was thought best to sink the shaft deeper in order to connect with other workings, and then it was discovered that the lime stratum was only a few inches thick, and under it was found twenty-two feet more of the best ore ever found in the property. Another lime stratum has now been encountered, but whether it is the footwall or the covering of another large ore body is not yet known.

ARTICLES OF INCORPORATION were filed with the Secretary of State in New Jersey last week for the New Mexico Railway and Coal Company, with a capital stock of $4,000,000. This at Santa Fe, New Mexico, is taken to mean that work will soon be commenced on the El Paso-White Oaks road, at least as far as the coal deposits in Salado canyon, 165 miles north of El Paso. It is estimated that it will require $1,800,000 to build and equip the road and about half a million will go into improvements at the coal mines, for which the Lowrey syndicate has paid Eddy Bros. $200,000. These mines show 6-foot wide coal veins, and their product can be delivered to the railways and smelters in Mexico and along the border, in competition with the Colorado, northern New Mexico and Thurber, Texas, coals. The building of this new line will open to the railways centering at El Paso a virgin country, rich in gold, copper, silver, timber, salt and many varieties of high-grade marble.

THE DeBeers Consolidated diamond mines' report for the year ending June 30, 1896, says that during the twelve months the diamonds produced realized £3,165,382. The total expenditure amounted to £1,452,528, including amount written off machinery and plant account, etc., and payment of £60,225 interest on the company's debentures and obligations, £206,754, leaving a profit of £1,712,854. Manager Gardner F. Williams reported that the total production of blue ground from the two mines was 2,698,109 loads, as against 2,525,717 loads for the previous year. The amount washed and crushed was 2,597,026, as against 2,854,817 loads. The increase of blue has been 101,083 loads, and the increase of lumps has been 121,254 loads, which now stands at 874,041 loads. The average yield of blue ground from both mines has been 0.91 carat, and the average cost of winning and washing has been $1.68 per load, as against 0.85 carat and $1.56, respectively, for the previous year.

PURSUANT to call there was a special meeting of the executive committee of the California State Miners' Association, at the Union League Club Rooms, San Francisco, on the evening of the 25th instant. Representation at the International Gold Miners' Convention at Denver, Colorado, July 7, 8 and 9, and mineral exhibition thereat were discussed. It was decided that there was not sufficient time to prepare a proper exhibit. The matter of representation was left to President Neff and Secretary Sonntag, who constitute a committee to appoint five delegates to the convention if deemed advisable. Regarding the Trans-Mississippi Congress, which meets at Salt Lake City, Utah, July 14, the president of the association was authorized to appoint two delegates thereto. A communication was read from the Sacramento, Cal., Chamber of Commerce regarding the recent complications in Nevada county, which have been fully reported in these columns. The communication was conservative and evinced a desire to be just. Its reading elicited considerable discussion, which took a wide range, the point being clearly made that the question, "What is hydraulic mining?" will necessitate new and satisfactory definition. The language of the Caminetti bill, enacted by Congress March 1, 1893, has recently been given new interpretation by the Federal Debris Commission at the instance of the Anti-Debris Association. Water operated under pressure, through a nozzle, against a natural bank, has been usually considered the normal element of hydraulic mining. If any form of mining in which water is incidentally used shall be considered "hydraulic mining," it will open up endless complications. The president of the association appointed Messrs. T. L. Ford and C. M. Cross a committee of two to further elucidate this matter. President Neff, with Messrs. T. L. Ford and A. J. Carrigan, also constitute another committee to meet the Sacramento officials as requested and endeavor to adjust the present difference, with due regard to mutual interests.

THE assayer of the United States at Helena, Montana, reports the mineral product of Montana for 1896, placing the output of gold, silver and copper at $50,732,019.13. The yield of gold was 211,915 ounces, valued at $4,380,671, and of silver, 15,730,022 ounces, valued at $10,324,877. A comparison shows that, while the production of gold increased 2549.375 fine ounces, or $53,680.68, during 1896 over that of the preceding year, the silver output decreased from 17,701,658.11 fine ounces in 1895 to 15,720,022.44 fine ounces in 1896, or nearly 2,000,000 ounces. During the year the largest gold producing property in the State closed down temporarily and only a few new gold producing properties were started up. From placer mines there was obtained 32,271 ounces of gold, valued at $667,099. The silver mining industry of Montana is decreasing in importance. The mines which have produced silver exclusively in the past have closed down, with the exception of properties at Neihart and Elkhorn. However, the production of silver is still large, due to the greater extraction of copper ore during 1896 than in the previous year. In 1895, 49.80 per cent of the entire silver output in the State was a by-product from the copper ores. The silver from this source increased to 10,614,000.62 ounces of fine silver in the total production of 15,720,022.44. The output of copper was 232,096,483 pounds, of a value of $25,356,540.77. This shows the increase over the production of the previous year to have been 31,002,491 pounds, or more than $4,250,000. Practically all of this is produced by the mines in Butte, in Silver Bow county. Recent discoveries promise a new field in the northwestern part of the State. Of lead there was a production of 22,521,340 pounds, valued at $670,009.87. By reason of large expenditures made by some of the most prominent smelting companies operating in the State, it is believed that the treatment charges will eventually be lowered and result in the opening of many properties yielding gold, silver, copper and lead, that are now idle. At present these improvements are in the direction of cheaper power.

The Hand Auger and Hand Drill in Prospecting Work.*

By CHARLES CATLETT, Staunton, Va.

Much has been done of late years to facilitate preliminary stratigraphical investigations, and for examination at considerable depths and in a certain character of material the diamond drill, in its general forms, certainly stands pre-eminent among the tools for such work. But there are large classes of deposits—indeed, I may say the larger proportion in which ordinary prospecting is done—which lie near the surface and are interbedded with soft and fine material. The method usually employed for prospecting these is by means of small shafts. These are sunk with considerable slowness and at considerable expense, depending largely upon the character of the material encountered, and are greatly interfered with by water. In this region the smallest are 3 by 4 feet, but they are usually considerably larger.

Having had occasion during the past year to do a large amount of prospecting work, I have found the use a hand auger and drill of immense value in this respect, and in my practice it has largely superseded, and always preceded, the other forms of investigation. I believe that the information desired was thus acquired at one-fifth what it would have cost by any other method. I am, therefore, satisfied that a brief account of the work of this device will not be without interest to the members of the Institute.

Mr. Darton of the U. S. Geological Survey has referred to the excellent results obtained in his work by the use of a small auger, and a similar instrument has no doubt been used for prospecting purposes; yet it seems to be to no one's interest to manufacture them—at least I could not learn of none on the market. I was, therefore, compelled to make them with such additions and modifications as experience showed to be necessary. The result may be summed up in the following description of a set of tools:

1. An auger bit of steel or Swede iron, with a steel point, twisted into a spiral, with an ultimate diameter of 2 inches and an ultimate thickness of blade of not less than ¼ inch. The point is found more effective when split. The length of the auger was gradually increased until about 13 inches was reached as the apparent maximum which could be used effectively. The 13-inch auger contains four turns. This was welded to the end of 18 inches of 1-inch wrought iron pipe, on which screws were cut for connection.

2. One foot of 1¾-inch octagonal steel, with a 2-inch cutting face, which is likewise welded on to 18 inches of pipe, cut for connections.

3. Ten feet of 1¼-inch iron rod, threaded at either end for connection with 1-inch pipe. When connected with one of the drill bits this becomes a jumper for starting holes through hard material. It is also used when desired to give additional weight to the drill in going through rock below the surface.

4. Sections of 1-inch pipe and connections.

5. An iron handle, with a total length of 2 feet, arranged with a central eye for sliding up and down the pipe and with a set screw for fastening it at any point.

6. A sand pump, consisting of 1 or 2 feet of 1-inch pipe, with a simple leather valve and a cord for raising and lowering it.

7. Two pairs of pipe tongs or two monkey wrenches, with attachments for turning them into pipe tongs.

8. Sundries—Twenty-five feet of tape, oil can, flat file, cheap spring balance, water bucket, etc.

The auger is used by two men, who, standing on opposite sides, turn it by means of the handle. The handle is also useful in giving a good purchase for starting the auger from the bottom of the hole, in opposition to the air pressure, which is considerable. Enough water is continually used to just soften the material. Usually the auger brings up a small portion which is dry and unaffected. Every few minutes, as the auger becomes full, it is lifted out, scraped off and replaced. The handle is moved up and tightened by means of the set screw as the auger goes down. At every slight change of the material the depth and character of the material are recorded.

When hard material is encountered the auger bit is screwed off and the drill bit screwed on, thus forming a churn drill, which may be used for passing through the hard material, the auger being replaced when softer material is reached. The churn drill is used by lifting it and letting it fall, turning it slightly each time. Its weight makes it cut quite rapidly. When the drill is used the muck is either worked stiff enough to admit of its being withdrawn with the auger, or it is extracted by means of the sand pump or a hickory swab. In either case the material is washed and a sample is obtained of the stratum through which the drill is cutting. After washing all the material from one stratum the washed material is mixed and a sample is put into a bottle and labled. In passing through "wash ore" (*i. e.*, iron ore consisting of small particles mixed in clay or other material that can be separated by washing) the material is brought up by the auger, put into a vessel with a perforated bottom (an empty tomato can, having holes punched in the bottom and provided with a wire handle, does very well), weighed by means of the spring balance, washed and weighed again, and thus an approximate idea is obtained of the proportion of ore in the material, while a sample is secured for analysis.

As the mere recollection of the contents of the several holes cannot be safely depended upon, it is very important that an accurate record be kept. To secure this is one of the difficulties encountered with ordinary foremen, though they are generally found to recognize accurately very slight changes of material. My foremen were provided with small vest pocket notebooks, and were soon trained to write down everything and to trust nothing to memory.

The holes were located as far as possible with reference to some natural object or to some other hole so located, and the distance therefrom was in all cases measured, not guessed at, the compass direction being recorded. Every hole was marked with a substantial peg bearing its number and location.

In designating the holes upon the record care was taken to avoid all causes of confusion. Separate properties, or great natural divisions on large properties, were designated by letters, minor divisions by numbers. For instance, we would have as the first number at a certain location on a property "Location H, Drill Hole 8000." The first number in the next natural division to the southward on the same property was designated "Location I, Drill Hole 9000," and so on. By allowing 100 holes for the minor divisions of each locality, it was made possible to return and put in additional holes without confusion or conflict. With such a record it was possible to plat the location of the holes in plan and elevation, and give a visible representation of the "lay" of the strata intersected.

Of course, the best work with such tools is done on soft material, but it is entirely practicable to go through hard material (a few feet of quartzite or flint and many feet of ore being often encountered in a single hole), and the ability of this simple contrivance to go through interbedded layers of hard and soft substances makes it very efficient.

The cost per foot increases considerably with depths exceeding 50 feet, but at the greatest depth I attained (some 80 feet) I did not reach either its capacity or the limit of its economical use as compared with other methods.

Up to 25 feet two men can operate it; from 25 feet to 35 feet three men are necessary; from that to 50 feet a rough frame, 15 to 20 feet high (costing something over $1), for the third man to stand on, is required. The frame can be moved from point to point. Above 50 feet it is generally necessary to take off one or two of the top joints each time the auger or drill is lifted.

The following record of some holes and the time employed will be of interest. Labor was paid 90 cents per day of ten hours. A foreman at $1.25 could watch three or four holes. The only current repairs consisted in sharpening drills, and their amount, of course, depended upon the material:

I.	*Feet.*
Sand and gravel	2
Yellow clay	2
Yellow clay and little ore	4
Solid ore	5
White clay and ore	3
Total	16

Two men 10 hours.

II.	*Feet.*
Loose slide	3
Blue clay	7
Shale ore	3
Wash ore (⅔ ore)	9
Shale ore	3
Wash ore (⅔ ore)	15
Total	40

Two men 11 hours; 3 men 4 hours.

III.	*Feet.*
Light yellow clay	12
Black flint	½
Light yellow clay	2½
White sand	1
Solid sandstone	2
Total	18

Two men 5 hours.

IV.	*Feet.*
Sand and gravel	1
Pink clay	18
White clay	10
Total	29

Two men 5 hours.

V.	*Feet.*
Light yellow clay	14
Solid ore	3
Yellow clay	1
Sol d ore	5½
Yellow clay	1
White clay	1½
Total	26

Two men 6 hours.

VI.	*Feet.*
Sand and sandstone (drift)	12
Dark yellow clay and ore (¼ ore)	3
Light yellow clay with little ore	7
Dark yellow clay and ore (½ ore)	9
Dark yellow clay with white flint	3
Light yellow clay with small quantities of ore	8
Dark brown clay with little ore	8
Very black clay with small quantities of ore	3
Dark yellow clay with ore (¼ ore)	2
Dark brown clay with small quantities of ore	5
Yellow lifeless clay	3
Total	63

Two men 5 hours; 3 men 25 hours.

The ore in most of the holes was brown hematite. In some of them it was manganese ore. It varied very greatly in hardness.

The above records represent, on the whole, the most favorable conditions, the hard material being, as a rule, less than one-fourth of the entire depth; but it is interesting to note how the drill carries through the hard material and how the auger takes up the work on the other side.

In addition to the economy of operation, which means either a saving of money for the same amount of information, or the expenditure of the same amount of money and the acquisition of more information, there are other marked advantages in the use of such tools. The land is not injured for other purposes. Badly located holes (and there are always such) do not remain as conspicuous blots on the property. The holes can be located at points where it would be exceeding inconvenient to put shafts. They can stand an amount of water which would add very greatly to the cost of shaft work.

The following describes the way in which I have used the holes in particular instances:

The iron ore deposits of the Potsdam, as they are found in Virginia, are well known to many of the members of the Institute. It is sufficient to say here that the beds of ore, of more or less regularity, are interstratified with clays and decomposed shales, and are characterized by numerous folds, bends, secondary concretions and drift material formed from the breaking down of the beds. The workings of the old ironmakers dot the horizon of these beds for several hundred miles.

In the examination of one of the old workings, consisting of a narrow open cut, which is about 1000 feet long, and must have been formerly some 20 feet deep, the natural supposition was that the old operators had commenced on the outcrop of the bed and had worked down as far as they could conveniently do so. But the important question was, Had they got through the beds, and was the remainder of the ore to be found in the direction of the dip, or was there still ore in the bottom of the cut? Holes put down at intervals along the bottom revealed no ore, while a line of holes, 50 feet apart, put down on the side of the cut in the direction of the dip, encountered, almost without exception, the beds of ore, and gave very positive information as to their average thickness, dip and composition.

From my experience of the past year with these drills I am sure their more extended use would be of immense benefit to the mining industry. As one of your members has pointed out, a good thing that is not patentable is rarely brought to the public attention, because it is to no one's interest to advertise it; but perhaps modifications might be invented increasing the convenience and efficiency of these already very effective tools, which would justify some one in making a specialty of them and bringing them to the attention of prospectors. Even without the protection of patents, I believe, the manufacturer of an outfit of the character I have described, if properly advertised, would meet an existing and increasing demand and benefit the manufacturer as well as the user of the tools.

* Trans. Am. Inst. M. E., Feb., '97.

Practical Notes on Hydraulic Mining.*

NUMBER VIII.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE H. EVANS, C.E., M.E., General Manager Cons. G. Mines of Cal., Ld. Oroville, Cal.

Round Beams.—In order to find the strength of a circular beam it is necessary to first work out the breaking load of a square beam of which each side is equal to the diameter of the circular beam, and multiply this load by .589, so the formula for the breaking load will read: $W=\frac{bd^2N}{l}\times X\times 0.589$.

Example 1.—Having a round beam of American cedar, 40 feet long between supports and uniformly loaded, with a diameter of 10 inches, the breaking load would be: $W=\frac{\frac{b}{10}\times\frac{d^2}{10^2}\times\frac{N}{62.5}}{\frac{40}{l}}\times\frac{x}{8}\times 0.589=7362$ lbs., or 3.29 tons, and the safe load would be $\frac{7362}{7}=1052$ lbs.

Oval Beams.—In this case first find the load for a rectangular or square beam, with sides equal to the two diameters of the oval beam, and multiply the result by 0.6.

Example.—Having an oval beam of American white pine, firmly fixed at both ends and loaded in the center, having 15 feet between supports, the smallest diameter 10 inches, the largest diameter 12 inches, and placed so that it would be 10 inches wide and 12 inches deep, the breaking strain or load would be:

$$\frac{bd^2N}{l}\times x\times 0.6.$$

Here, on referring to the multiplier given in proportion of strength, we find x=6, and therefore

$$W=\frac{\frac{b}{10}\times\frac{d^2}{12^2}\times\frac{N}{102\,5}}{\frac{15}{l}}\times\frac{x}{6}\times 0.6=35424 \text{ lbs., or } 15.8 \text{ tons,}$$

and the safe load would be $\frac{15.8}{7}=2.26$ tons.

Triangular Beams.—To find the breaking or safe load for this class of beams, first find the strength of

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a square beam with equal sides, and divide the result by 3.

According to experiments made by Barlow and others, it was found that triangular beams were ½ stronger where the base of the triangle was up, and it was found necessary to provide in the support a triangular notch in which to place the sharp edge of the beam.

Strength of Chains.—The strength of chains varies, owing to the nature of the iron from which they are made and their mechanical construction. The strength also varies as the square of the diameter of the iron from which the links are made. Experiments show that a single-link chain from good iron carefully welded, made from 1 inch diameter round bars, has a safe working strain of six tons. Great care must be exercised in using chains on loads that would cause disaster in case of breaking, and each link should be carefully examined, always bearing in mind that the strength of the chain is only equal to the strength of the weakest link. Many serious accidents have been caused by not paying proper attention to this fact.

There are many formulæ for determining the safe load for and breaking strength of chains, all of which are only approximate and depend upon careful examination prior to attaching the load. For crane chains the breaking load can be found by multiplying the square of the circumference of the link in inches by 32.4, and for the safe load divide the result by 6.

Example: What is the breaking load of a chain made with links from a round bar of iron ¾ of an inch in diameter? Answer: $75^2 \times 32.4 = 18.225$ tons, and safe load $= \frac{18.225}{6} = 3.04$ tons, nearly.

Another simple and approximate result is to divide the square of the diameter of the iron from which the links are made by 9, and the result is the safe working strain or load.

Example: A chain made from round iron ½ inch in diameter, the safe load would be 4 (the number of eighths of an inch in ½ inch) squared, or 16 divided by 9=1.8 tons, the safe load.

The same result, nearly, is obtained by squaring the diameter of the link iron in inches and multiplying by 7.111. Taking the above example the answer would be: $.5^2$ or $.25 \times 7.111 = 1.77$ tons.

To find the diameter of the iron in eighths of an inch that the links should be made from, to safely support a given load, proceed as follows: Multiply the weight to be hoisted or hauled in tons by 9 and extract the square root of the product, and the answer will be the number of eighths of an inch there should be in the diameter of the links.

Example: What sized iron should the links of a chain be made from to safely support a load of two tons? Answer: $\sqrt{2 \times 9} = \sqrt{18} = 4.24$ eighths of an inch, or a little over ½ inch in diameter.

Some readers will no doubt recall instances to their minds where they have lifted much heavier loads with such chains as shown in the examples given. Although this is often done without any bad results, nevertheless these rules should be followed whenever possible, and especially when chains are used for long pulls and subject to heavy strains, as it is much better to err on the safe side.

While dealing with the strength of chains, it may be of interest and information to readers to have the following table which I have in my pocket-book and often find of great value in making calculations as to strength of iron, bolts, bars, rivets, etc.:

Tensile Strength and Shearing Strain of Iron and Steel.—

	Tensile Strength per Sectional In.	*Shearing Strength per Sectional In.*
Cast Iron	7	9
Wrought Iron rolled bars	25	20
Best Lowmoor rivets	29	23
Cast Steel, best quality for tools	52	39
Double Shear Steel	40	30
Cast Steel Boiler Plates	48	36
Puddled Steel Boiler Plates	42	31½
Bessemer Steel Boiler Plates	32	24
Steel Bars	45	31½
Cast Steel Rivets	49	37
Wrought Iron Plates, lengthway	22½	18
Wrought Iron Plates, crosswise	20½	16½

It is as well to explain, for the benefit of some readers, that tensile strength of any material is the weight attached to the end of a bar that will tear it asunder, and the shearing strength is the weight or pressure that will cut the material through.

In calculating the strength of screw bolts, of course a proper allowance must be made for the thread, and an approximate allowance is to deduct $\frac{1}{10}$ from the diameter of small bolts, and from ⅛ to ¼ for large bolts. For instance, a bolt ½ an inch in diameter, deduct ⅛ of an inch for thread and calculate the strength of said bolt as if it were a ⅜-bolt, instead of a ½-inch, and with a bolt 2 inches in diameter, deduct ¼ and call it ¾, when calculating its working or safe load.

In order to fully explain the use of the above table of tensile strengths and shearing strains, I give an example as follows:

What is the tensile strength of a bar of iron 2 inches in diameter?

Here 2 inches in diameter has an area or cross-section = to 3.141 sectional inches, and $3.141 \times 25 = 78\frac{1}{2}$ tons, and the safe load would be $\frac{78.52}{7} = 11.22$ tons.

(To be Continued.)

From Mine to Mint.

NUMBER III.

By D. K. TUTTLE, Ph. D., Melter and Refiner of the United States Mint at Philadelphia.

Acid-Parting Processes.—Acid-parting processes depend upon the solubility of silver, copper, etc., in an acid which will not attack the gold. Strong sulphuric (oil of vitriol) is such an acid, and nitric acid is another, but their mode of action and the apparatus required are quite different. The use of each will be described in detail.

The Nitric Acid Process.—This is the oldest and until a comparatively recent date the only method in use for parting gold and silver. The first notice we have of its use on a large scale was in the fifteenth century, and proved a very profitable one, by some Germans at Venice, who employed it in extracting gold from Spanish silver, keeping their art a secret. They acquired with their wealth the title of "gold makers" by their mysterious operations.

Parting by nitric acid is conducted on a large scale in much the same manner as an assay of gold bullion is made in the laboratory. It consists of the following operations:

(1) Assorting and proportioning the bullion; (2) granulation of the same; (3) solution of the silver in acid; (4) treatment of the gold residue; (5) precipitation of the silver as chloride; (6) reduction of the chloride by zinc; (7) washing, drying and melting the parted metals.

It is of course desirable that the bullion should be approximately free from base metals other than copper. Tin, antimony and arsenic are especially objectionable, the two former not being soluble in nitric acid. They give insoluble oxides, which remain behind with the gold and must be removed in the crucible by suitable oxidizing fluxes. Copper, on the other hand, acts as a substitute for silver in the parting process, being, as it is, readily soluble in nitric acie. When silver deposits are scarce, therefore, such as have considerable quantities of copper, whether of gold or silver, are not undesirable, although the copper requires more acid for solution than the silver which it replaces.

It was originally thought that the proper proportion for parting was three parts silver to one of gold, hence the name "quartation" given to the process. Experience has shown, however, that a lesser proportion of silver is quite as effective, and that the copper may be considered as silver for parting purposes. The proportion of gold to silver (and copper) used at the Philadelphia mint is 1 to 2½.

The necessary calculations having been made, the deposits are assorted into melts of about 4000 ounces each, preferably by mingling gold and silver deposits. If the latter are not on hand in sufficient quantity, fine silver is substituted. The "melt" is now brought to fusion in a large crucible, thoroughly mixed, and then by means of a dipping cup is poured into cold water from a height of some 3 feet. The cup is given a peculiar swirling, wavy motion, by which means the thin stream of molten metal is broken up when it strikes the water into leafy granules and hollow spheres, not unlike golden popcorn in appearance—this to expose as much surface as possible to the action of the acid. These granulations are dissolved in porcelain vessels of about thirty-three gallons capacity. Twelve such vessels are placed in a large water bath in what is called the "parting house." Provision is made for heating the water, surrounding the jars, and a connection from the top of the house to a chimney serves to carry off the acid fumes.

Each jar receives a charge of 190 pounds of granulations and 175 pounds of strong nitric acid. When the first strong action has subsided, steam is admitted to the water surrounding the jars. The metal and acid will about half fill the jar. At intervals of twenty minutes the contents are thoroughly stirred with a wooden paddle, the doors on the side of the house being raised for the purpose. The charge is kept boiling gently during six hours, by which time most of the silver will have been dissolved, leaving the gold as a granular sediment. The steam is turned off from the bath, and hot water added to the jars to dilute the strong silver solution. After subsidence of the gold, the clear solution, containing silver, copper, lead, etc., is siphoned off and transferred to the precipitation tank. The jars are again filled with hot water, the contents well stirred, and again allowed to settle. The clear liquid is added to the first, and fifty pounds of fresh, strong acid added to each jar. The boiling is renewed for five or six hours, when washing of the gold by decantation is several times repeated. The gold sediment is now transferred to a lead-lined tub, mounted upon a truck. The tub has placed in it a perforated false bottom, which is carefully covered with cotton cloth, the whole constituting a large colander or movable filter. Water is now passed through the gold until most of the silver has been removed, the wash waters being transferred, as before, to the large tank for precipitation.

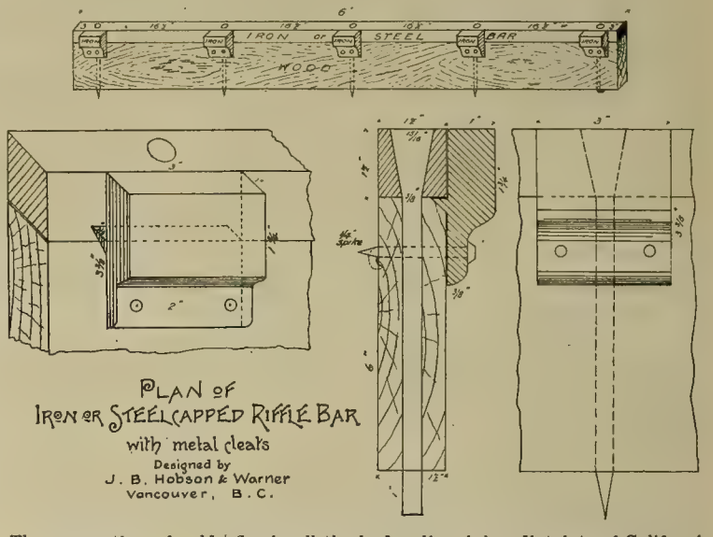
From this filter the gold is transferred to cast iron pots, in which it receives a boiling in strong sulphuric acid, to which a small quantity of niter is added. This treatment extracts an additional portion of silver and materially increases the fineness of the gold. The strongly acid liquor is ladled off into vessels partly filled with water. From this solution the silver and a little gold are periodically recovered as "residues." The gold is thrown from the iron pots into water, washed a number of times by decantation, and then thoroughly sweetened on a portable tub filter, such as has been described. It is now dried and melted. If a sample bar, upon trial, proves to be tough, the melt is now ladled into molds, giving bars of some 300 to 400 ounces each. If the trial bar is brittle, the molten mass is fluxed with niter through an "eye" of bone ash. The niter oxidizes lead, antimony, arsenic, sulphur, etc., the products being absorbed by the bone ash cover.

About 6000 ounces constitute such a melt, and we have some fifteen bars of a fineness of 0.998 or 0.999, and worth, say, $8000 each.

(To be Continued.)

Iron-Capped Riffles.

The abundance of cheap timber for blocks and riffles in all the hydraulic mining districts of California has prevented the general adoption of more lasting paving for sluices, where stone is not used. Yet a number of devices for iron-capped riffles have been invented, and iron or steel rails have been in many cases substituted. The great advantage of these over stone and block paving is in the ease with which with them sluices may be cleaned up. The greatest disadvantage in the use of wooden riffles is that they wear away quickly. Where hydraulic mining is conducted in districts where wood is expensive, iron or iron-capped riffles must in time replace those of wood.



PLAN OF IRON OR STEEL CAPPED RIFFLE BAR with metal cleats
Designed by J. B. Hobson & Warner Vancouver, B. C.

The accompanying cut illustrates a style of iron-cap riffle designed by J. B. Hobson and Mr. Warner. Mr. Hobson had long experience in this State and is now in charge of large gravel properties in the Cariboo district, B. C.

Australasian Gold Yield.

The following has been received from Consul-General Maratta, Melbourne:

On the 31st of last December the gross output from Australasian gold fields amounted, according to the published statistics, to 99,592,305 ounces, as follows:

	Ounces.
Victoria	61,034,884
New Zealand	13,312,837
New South Wales	11,710,510
Queensland	11,172,073
Western Australia	967,626
Tasmania	886,822
South Australia	507,553
Total	99,592,305

This enormous mass of gold represents the work of the miners from the discoveries in 1851 till the close of 1896—say, forty-five and a half years. It will be noted that the total falls short of 100,000,000 ounces by 407,695 ounces. As this amount is very much less than the average yearly yield, it follows that the shortage will be made up very early this year. Moreover, figures show that the yield is increasing:

	Ounces.
1894	2,343,716
1895	2,359,244
1896	2,375,948

Mining Summary.

CALIFORNIA.

Amador.

Ledger: The shaft at the Oneida is now down about 950 feet. The rock is not breaking as well as they would like, but still it is better than it has been.

The north drift in the Anita is now in over 400 feet and the work in it is still progressing toward the Shober ore chimney. Ledge matter has been encountered the entire distance.

The excavation for the 40-stamp mill at the Argonaut has been completed and the work of putting in the foundation was commenced last week.

Mining operations at the Jackson Gate mine, which has been prospected for the past two years by one of D. Gutmann's companies, has been suspended and the machinery taken off the property.

Record: At the Guiliani mine, on Sutter creek, M. D. Nixon has lately obtained possession and is running a tunnel from the creek bank to tap the ledge in depth. The tunnel has been extended 110 feet. The ledge is from 4 to 6 feet wide.

Owing to the death of W. B. Carr, one of the principal owners in the Gover mine, all work has been suspended with the exception of keeping the pumps going.

Republican: The Kennedy Mining Company contemplate many improvements during the present year. Greater facilities and improved machinery will be among the new features.

The 10-stamp mill recently erected at the American by W. Dennis will begin operations soon.

C. M. Meeks is making arrangements to do prospecting on the old Meeks tract south of the Zeila mine.

Calaveras.

(Special Correspondence).—The May Day Company have bonded the Gold Bug mine, which, with the four locations of the May Day group, gives them five full claims. At present they are driving a crosscut tunnel from the base of the mountain to the south of the mines. The tunnel will be about 2000 feet long and will tap the mines 600 to 700 feet deep. As the mountain is seamed with quartz ledges, they expect to develop a large number of veins in addition to the ledges that they have opened from the surface. Naylor Williams has secured the O'Henio & Frasier mine, which shows very rich ore. The Buckhorn group, Beatrice and Mayflower have been secured by a Chicago company, who will develop it. The Falcon is bonded to a Portland company. The ore in the Falcon is rich in visible gold and tellurium. The Old Calaveras is being reopened by J. W. Henderson. The Collier mines have been developed by Z. A. Willard and Eastern capitalists interested by him. The mines are in charge of his son, J. Willard. The Central Hill hydraulic mine is running full handed and taking out its usual amount. It is rumored that the old Oro Plata mine will be reopened. It is a big property if properly developed and operated. The hills are full of prospects that only want money to make them mines.

Murphys, Cal., May 24, '97.

Amador *Ledger*: The facts as to the strike in the Gwin mine are that very rich gold-bearing rock has been discovered running through the ledge in a wide seam in the north drift at the 1300 level. The seam is immensely rich and will go several thousands per ton, while the balance of the ledge is good milling ore. The ore is too rich to go into a mill, and, as the company is not prepared to handle it, Superintendent Thomas and David McClure, chief owners of the concern, who are on the ground, decided to lag up the drift for the present and proceed to arrange to handle the gold, which doubtless extends throughout the depth of their ledge. They are crushing 120 tons of ore per day with their 40 stamps.

Nevada.

(Special Correspondence).—The committee of the Sacramento Chamber of Commerce, after a careful examination of the methods of gravel mining at You Bet, has made its report. Meanwhile the Red Dog mill, which was enjoined from operating, is still idle, in obedience to the courts. However, the time during which this property is open to work on account of water supply is rapidly passing by. Six weeks more at the utmost closes the season. Men are out of employment in the meantime, water goes to waste, gold remains in the hillside instead of being put into circulation, and hungry mouths are dependent upon work in the mine.

Without any intention of passing upon the opinion of others, the writer, who made a second trip to the properties in question, and who is quite familiar with the different methods of gravel mining, and with the law governing the case, would say that the whole affair in dispute resolves itself into this: Are the parties at You Bet disobeying the law by their methods of mining? They are not hydraulicking; they are merely ground sluicing. The answer is self-evident. Engineers and members of public works will see practically as other capable men view the situation.

The people of You Bet were not violating the law; yet it becomes possible for an individual, who must make some record and plausible excuse for drawing his stipend, to bring an injunction and stop the earning of wages by deserving people in their honest pursuit.

It is a very mild stricture to say that this affair is not only a gross injustice, but is the outgrowth of a shortsighted policy, a seeming gratification of spleen, a mercenary motive, that benefits an individual to the injury of a whole community, and the jeopardizing of large and widespreading business interests.

Nevada City, May 24, '97.

(Special Correspondence). — About seven miles above Washington is situated Maybert, scattered in its mining properties on both sides of the Yuba river. With its record of products in gold from the several mines in the neighborhood, none of which have been worked to any great depth, and with the great advantages for operating the properties through tunnels, capital will soon find its way hither to unearth the mineral wealth of this section.

The formation changes radically in the short distance from Washington. In and about Maybert it is a syenitic granite, and some maintain it is a contact.

At the Governor Morton, owned by Bonney & Ritchie, the ledge averages 3 feet. The tunnel is in 220 feet, and ore is stoped to facilitate operations because of limited means. A small rotary mill grinds out ore that nets $10, and no sulphurets are saved.

The Blue Jay, owned by Bonney & Baugh, is 300 feet above the river and has a 5-stamp mill. It is in syenitic granite and is within 100 yards east of the contact. By running a 1200-foot tunnel 1000 feet in depth could be attained. The ore averages $14 in free gold. Water to any amount desired is available.

In this vicinity is the old Lindsay, which has been abandoned for twenty years. The prospect for reopening this by a tunnel that would give about 1200 feet backs is good. Some twenty-five years ago $150,000 was refused for this mine. Death of the principal owner caused it to be closed. San Francisco and Nevada City capital is about assured to make a deep mining test of the property.

With the available electric power that is rapidly becoming the popular feature in this county, and the undoubted mineral resources of Nevada county, this great mining district is still in its infancy so far as gold mining is concerned. Prospects are being steadily developed and they are offered on reasonable terms.

Maybert, May 24, '97.

Telegraph: Among the mines that have been closed for years and are now being further developed are the Gold Hill, Massachusetts Hill, Granite Hill, Homeward Bound—lately acquired by purchase by the Omaha Consolidated Gold Mining Company, the Allison Ranch and Bullion mines.

The Gold Hill Company is steadily sinking its shaft and driving drifts north and south on the 400-foot level.

The Massachusetts Hill Company has decided to sink another vertical shaft, to further facilitate the workings of their property.

The Granite Hill Company is steadily developing its mines.

The Omaha Consolidated Gold Mining Company has commenced the sinking of a new incline shaft. The initial development will consist of sinking the shaft to cut No. 8, No. 10 and No. 11 drifts of the Lone Jack south.

The Allison Ranch Company is pumping and retimbering its mine to the bottom levels.

The Bullion Consolidated Gold Mining Company have sunk their shaft to a depth of 840 feet, and have encountered the ledge and are now running drifts north and south.

Herald: At the Milliken mine the shaft is down over 600 feet, and Superintendent Durbin expects to make a station and begin drifting when he gets about 30 feet deeper.

Plumas.

Independent: The work of pumping out the Thistle mine is progressing slowly, the water in the shaft having been lowered at this date 14 feet.

National-Bulletin: At North Fork on the Scott drift mine a small force of men are employed and good results being obtained.

Below this is the San Jose location, owned by Hugh Kelley, who is driving a tunnel to open up the channel.

On Angus Cameron's mine several men are employed.

A force of men are driving a new tunnel into the Glazier to tap the channel at a greater depth than was done by the first tunnel.

Austin and Cadle who have the Pliocene drift mine leased from Bransford, Austin and Higbie, are takink out good pay.

San Diego.

Union: L. N. Bailey is about to resume operations on the Kentuck mine at Julian. This mine, long ago, was one of the principal producers of the comp.

Moore and Standish have bonded a two-thirds interest in the Bay Horse and Irma mines in Mesquite district for $5,000.

Sierra.

Enterprise: At the Golden Star drift mine Wm. Hanley is working a number of miners.

The Docile quartz mine has been bonded and a shaft will be sunk on the lode.

Shasta.

Searchlight: The Top Not mine has been bonded for $9000 to the men who recently did development work on the Delta. Ex-United States Marshal Frank has charge of the property. A contract has been let to deepen the shaft 75 feet. A 10-stamp mill will be erected during the summer.

M. D. Butler and son have resumed work on the Delta mine, but are about to close a deal with San Francisco capitalists for a bond on the property.

J. Bischelt has struck rich ore on the west extension of the Gold Standard, and F. K. Fritz is developing his claim on the east extension of the same ledge, and with good prospects.

On the Paymaster mine, owned by McCourt & West, a tunnel has been run 250 feet, and some rich auriferous gravel encountered in the bed of the old channel, which is 80 feet above the present channel. Nuggets weighing from $60 to $70 have been found during the past few months.

Siskiyou.

News: Sipe Brothers have begun work at their quartz mine in New York gulch.

Preparations are being made for the erection of a new stamp mill on Indian creek by the Miller & Parker Company.

The hydraulic mines of Wright & Fletcher, S. R. Gardner and Eastlick Brothers at Oro Fino, will probably run until July 1st.

Active operations have begun at the Last Chance mine, near Callahans, under S. J. Fore. The elevator will be lowered so that they can get down to bedrock.

The water supply of the hydraulic mines about Hooperville is falling. The Bay City mine, owned by Moore, Hamilton & Co., and Geo. Baker's mine are still running pipes. Parker and Castello are cleaning up bedrock.

Several hundred acres of placer ground was located in Happy Camp district this week by men who have the means and enterprise to develop the property.

The new tunnel at the Commodore mine has tapped the ledge at a distance of 274 feet from the surface, and the rock shows prospects above expectations. The ledge is 2½ feet in width.

Journal: The Klamath River Flume and Mining Company, who expect to develop a large property near Happy Camp, have had several surveying parties out lately locating the best route for a ditch.

The Nanetta B. mine, on Thompson creek, is said to be paying from $500 to $1,000 a day, which makes it about the best paying mine in the county.

The small placer mines in the vicinity of Hawkinsville have been compelled to close down, owing to a scarcity of water. Some seasons they are enabled to run up till the first of June.

Day & Son, who are the principal investors in the Klamath Flume and Mining Co., will start two carloads of machinery from Portland next week for use at the mine.

The big pump at Shasta river has been kept running night and day of late, and furnishes an abundance of water for the Hunter & Simmons mine below Hawkinsville. The water pumped at night, is run into a reservoir and then piped to the mine during the day.

Finley D. Fraser has sold to the Golden Eagle Quartz Mining Co. of West Virginia three quartz ledges on Indian creek, known as the Robert S. Green, Black Crow and May Apple ledges, adjoining the old Golden Eagle.

L. F. Coburn has leased the Erno & Morrison mill in Quartz valley, and also one of Erno's mines.

The Golden Eagle ledge on Indian creek, from which the London Q. M. Co. crushed some rich quartz about the beginning of the sixties, is to be reopened.

The shaft at the Blue Gravel mine on Greenhorn has been sunk to bedrock, at a depth of 108 feet, and the gravel is expected to pay well.

Reporter: At the Gold Run mine at Hungry Hill, owned by Dannenbrink Brothers, a 4-foot ledge of high-grade ore has been encountered in the new 1200-foot tunnel. The 400-foot raise to the tunnel above has been completed, which furnishes plenty of pure air for the miners. It is estimated that there is enough ore in sight to keep a 10-stamp mill going day and night for seven years. Fourteen men are employed at the mine.

A new tunnel is being driven to tap the ledge of the Taylor mine in Cottonwood district.

Work is going rapidly ahead in the tunnel of the Bonanza King mine owned by A. Davis & Company.

Trinity.

An Oakland company has purchased the Rumfeldt mine near Carrville. This property consists of about 100 acres of good auriferous gravel.

The new pump at the Altoona mine, at Cinnabar, has been placed in position and started up. It is hoped that in two weeks the water will be lowered below the upper levels. When the mine is pumped dry about eighty more men will be given employment in and about the mine.

Tuolumne.

Union-Democrat: At the Rawhide the main shaft has reached the 1100 level. It will be continued to the 1200, when crosscutting and drifting will be commenced. Later on the shaft will be run down still another hundred feet. Work is also being pushed on the north drift of the 800, but the ore which keeps the 40-stamps dropping comes from the stopes between the 1000 and 900 the 900 and 800. It has not yet been decided whether a cyanide or concentrating plant will be put up, but probably the former will be adopted.

At the Black Oak the main shaft has reached the 800-foot mark, with a big body of fine ore in sight. Drifting still continues north and south on the 700 level, and the main portion of rock reduced still comes from those points. The shipment of 200 tons per month to Selby's keeps up regularly. The work of putting on the additional ten stamps to the mill and the erection of the cyanide plant is being hurried along as fast as possible.

At the App the main shaft is down to the 900 level, with a strong 25-foot vein of quartz in the bottom. The mill is being fed from ore taken from the stopes of the 800 level.

The New Era, owned by Holland and Trewartha, will be put in working order this summer, and started up with entirely new machinery.

Independent: The Omega mine which was recently sold to a Scotch syndicate will soon commence operations.

The 80-stamp mill to be erected on the Pino Blanco has been ordered and work on it will be immediately commenced.

NEVADA.

Silver State: At Golconda a number of quarrymen and masons have arrived at the Adelaide copper mine. Buildings will soon be erected to accommodate the workingmen, who are arriving daily. The townsite has been laid out south of the Golconda hot springs hotel, and the plant is to be located east of the townsite. The water supply has already been provided for in Robinson's basin, where two large dams have been built.

At Jersey, Humboldt county, a once prosperous mining camp not very distant from Kennedy, J. W. Abel and sons are working on the old Jersey mines and other claims and are taking out some very rich lead ore which is being shipped to the smelting works of Selby & Co., San Francisco.

Ford, Douglass and others have a lease on the old dumps and are working them over with a jig with a capacity of ten tons a day and are making good wages. They have enough to keep them busy for at least four years.

At Kennedy J. A. Blossom has several men working on the Gold Note and other claims, which look encouraging.

At Spring valley J. B. Foltz and Sons have their hydraulic works in operation and have plenty of water with which to work.

At Bloody canyon John Taylor is working on his antimony mine in which a 3-foot vein of antimony was recently struck. He is getting ready to make a shipment of ore.

OREGON.

Medford *Mail*: The old Bybee quartz mine on Rogue river, below Galice creek, is now the property of Turner & Sanders who will resume work this summer.

Work still continues at Baylor & Iliff's pumping plant on Rogue river. This plant has been working now for some five months and it has been demonstrated that it is a paying enterprise.

Dowell & Belding's 5-stamp mill started up last week on Green's creek.

A. W. Fox and others have taken charge of the Strong & Phillips copper ledge in Waldo district, and will sink a shaft 100 feet and then run a drift of the same length.

Rogue River *Courier*: The 5-stamp mill at the Jewett mine will be in operation in a few days. Some 100 tons of ore are ready for grinding.

Layton is running two placer mines with abundant water, one on Williams creek and the other on Ferris gulch.

Pollock & Co. are in over 100 feet on a ledge at the head of Jumn-off-Joe which widens as they advance. Hitherto an arrastra has done the crushing but sulphurets lately appear and so a stamp mill with concentrator are being considered.

Baker City *Democrat*: The shaft at the Virginia Consolidated is now at a depth of nearly 600 feet. Crosscutting will be commenced soon.

The Flagstaff mine, five stamps, is running ten hours daily. The water in the shaft is increasing and it is expected there will soon be a sufficient supply to run all the stamps of the mill for twenty-four hours.

At the Gold Ridge mine the machinery for hoisting works will be put up at once to admit of deep sinking operations. A vertical shaft has been started and will be run to a depth of 500 feet before crosscutting.

The big ditch which has been in course of construction for several months for the Flick Bar Placer Mining Company has been completed.

T. A. Walley and L. E. Riter, owners of the Sixteen-to-One group of mines in the Pleasant Valley district, are preparing to extensively develop them.

WASHINGTON.

Spokesman-Review: At Chewelah a large body of ore has been struck on the Copper King mine the ore showing native copper.

At Eureka camp on the Colville reservation a tunnel 118 feet long on the Lone Pine crosscuts several veins of from 2 to 4 feet, but at 102 feet they struck a ledge 16 feet wide and 80 feet below its cropping on the surface. This ledge is as fully free miiling at that depth as at the apex of the vein.

Seattle *Times*: At Snohomish the Naiad Queen and Belcher claims are to be worked.

A number of miners have gone to work on the P. and I. mine near Monte Cristo under contract with the company to do 100 feet of tunnel.

The May Creek Mining and Milling Company put eight men to work this week on their property.

At Silverton the main ledge has been struck in the St. Louis on Deer creek. A four-drill compressor was placed on the property and a crosscut started, and at a distance of 240 feet an 18-inch vein of well defined ore was exposed.

Bessie and Rhodes of the Double Eagle, with a force of seven men, are building camps near their free milling propositions on Cole creek. The placing of a stamp mill on their property is now in contemplation.

BRITISH COLUMBIA.

The annual report of the president of the Iron Mask gives the following financial statement for the year ending May 1, 1897:

Total amount of ore shipped (tons)	1,749 65
Cash realized on same	$55,946.97
RECEIPTS.	
Managers' per cent	$ 3,286.90
Sales of ore	55,946.97
Money advanced by War Eagle Co	13,000.00
Total	$73,133.87
DISBURSEMENTS.	
Operating exponses	$66,529.78
Cash in treasurer's hands	6,604.09
Total	$73,133.87

The exports of Slocan ore via the outport of Revelstoke for the month of April were:

	Tons.	*Value.*
D. N. White	300	$24,048
Idaho	134	15,199
Enterprise	40	6,573
Monitor	20	2,510
Mountain Chief	20	1,481
Hustler	19	2,733
Totals	533	$52,544

President Clarke, of the Old War Eagle Company, in his annual report, submitted a financial statement of the company's affairs

from the beginning of operations, December 3, 1894, up to May 1, 1897, as follows:

Total amount of ore shipped, pounds	41,514,425
Total amount of ore shipped, tons	20,757 21
Total amount of cash received on above	$501,150 78

RECEIPTS.

Sales of ore	$501,150 78
Virginia Company, supplies	10 66
Rossland lots $2,050, less improvements $1,474.75	575 25
War Eagle sale	700,000 00
Total	$1,201,736 69

DISBURSEMENTS.

Operating expenses	$ 252,046 11
Dividend per cent., sales ore, etc	217,320 00
Dividend War Eagle sale	603,760 00
Iron Mask loan	13,000 00
Iron Mask supplies	10 66
Cash in treasurer's hands	$8,459 62
Unpaid dividends	6,231 00 14,690 62
Total	$1,201,736 69

The following table shows the product of the Kootenay mines for the week ending May 15. The total value will doubtless reach $3,000,000 for the first five months of 1897:

BULLION AND MATTE.

	Pounds.	Value.
Trail smelter	244,657	.....

ORE.	Approximate Tons.	Value.
Noble Five mines, Slocan	98	.....
Slocan Star, Sandon	135	.....
Slocan Boy mine	17	.....
Little Phil mine, Ainsworth	19	.....
Black Diamond, Ainsworth	18	.....
Total for week	409	$ 94,947
Total so far for May	980	231,982
Total for April	3,764	433,234
Total for March	5,822	677,681
Total for February	5,201	562 853
Total for January	4,543	675,506
Total via Revelstoke May 12	2,296	223,382
Total so far for 1897	22,586	2,794,638

Spokesman-Review: The manager of the Jumbo reports that about 1000 feet of tunnels, drifts and shafts had been opened. Work is now being done on the lower tunnel. They are in about 350 feet, and expect to cut into the ore body in about 100 feet more.

At Kaslo George Nelson, acting as agent for eastern capitalists, has bonded the Morning Star, in the Jackson Basin group of mines, from Jackson Bros. The consideration is $25,000, upon which $2000 was paid in cash, the balance to be paid in six and nine months.

C. L. Webb and his associates of Seattle have made the final payment on the Montezuma mine, located on the south fork of Kaslo river. The amount, $15,000, was not due until August ,19th. The mine will shortly be equipped with a concentrator and tramway.

The Reco is one of the winter mines of the Slocan at present, as it is necessary to take the ore out on rawhides. Up to the present time it has paid $150,000 in dividends, the last being May dividend of $50,000. In the winter season they employ from 85 to 100 men. The ore body is now about 20 inches of high grade, running about 700 ounces to the ton.

In the Ainsworth camp there are about 200 miners employed. The Canadian Pacific M. & M. Company have twenty men at work under M. A. Hallman. They are running the mill all the time.

Eight men are at work on the Ajax, one of the Laurier Gold and Silver Mining Company's properties.

Rossland *Miner:* The Josie has resumed shipments. The mine can easily supply a carload of ore a day for an indefinite period.

The Kootenay and Columbia will also resume shipments this week.

The Cliff is ready to resume shipments. Several hundred tons of ore are on the dumps of the upper tunnel, and the mine is being put in shape to produce regularly.

It is expected the aggregate shipments this week will be much the largest in the history of the camp.

The Black Bear now has one of the largest ore bodies ever opened in the camp. The Black Bear lies between the White Bear and the Le Roi and belongs to the Le Roi Company. The ore body is 12 feet wide. The ore now being taken out looks like the standard Le Roi ore and carries 4 or 5 per cent of copper.

Spokane *Chronicle:* At Rossland some rich copper ore has been found in the Jo Jo, west of the Commander. The lead is supposed to be the same as that which runs through the Commander.

Work has been resumed in the face of the St. Elmo tunnel, and the showing there is the finest ever seen on the property. The tunnel is now in nearly 500 feet.

At Ymir the Black Hawk mine has been bonded for $75,000 upon a 5 per cent cash payment. It is the intention of the new company to put a force of men to work at once.

The New Victor Mining Company have commenced development work and have erected the necessary buildings.

ALASKA.

Miner: The five-compartment shaft which is being built by the Treadwell Company is rapidly approaching the surface. It has now reached a point within 50 feet of the top.

At Sheep Creek, in the Nowell mine, in addition to the fifteen extra stamps, five more concentrators will be installed, and the present output of the mill will be more than doubled.

The Silver Queen tunnel No. 1 is in about 600 feet. It will be driven a distance of 280 feet farther.

No. 2 drift in the Glacier is 400 feet long; No. 3 drift is 483 feet long and in ore its entire length, and has 4 feet of ore on the face. This is 280 feet from the surface. No. 4 crosscut is in a distance of 370 feet, and 156 feet of it in ore.

UTAH.

Salt Lake *Tribune:* The directors of the Golden Bar Mining Company have decided to continue development work on their property at West Dip, and to go to whatever depth may be necessary to reach the ore bodies.

The management of the Brickyard have decided that before beginning the construction of the mill to conduct a series of experiments at the Golden Gate's experimental plant. The ore bodies in the Brickyard are among the best that has been uncovered at Mercur.

At Park City J. J. Daly states that there is no probability of the Daly-West shipping any ore in the near future, unless the action of the railroads in increasing the rates on ore and the action of the smelters in increasing treating charges is reconsidered. The work of sinking the shaft to the 1300-feet level has been completed, and the men engaged in the work, about twenty in number, will be laid off.

The hoisting works which were intended to be erected at shaft No. 2 of the Creole, will be erected on the Typo group, just above the Creole.

The Sioux-Ajax tunnel has now reached the 2400 foot station and with the new air compressor will advance at the rate of over 65 feet a week.

In the Daly-West in an upraise from the 900-foot level a body of ore has been encountered that is rather richer than the general run of mineral in the mine. It will assay 100 ounces in silver and 30 per cent lead. The pay streak is 3 feet in thickness.

The tunnel on the Dutch Canyon property is in about 600 feet. There are abundant indications of copper on the surface of the ground and they are now beginning to appear in the tunnel.

Tintic *Miner:* The shipments for the week were as follows: From the Bullion-Beck mine, fifteen carloads of ore; Bullion-Beck mill, three carloads of concentrates: Centennial-Eureka, three carloads of ore; Eureka Hill mill, five carloads of concentrates; Uncle Sam, four carloads of ore; Humbug, two carloads of ore; Mammoth mill, seven carloads of concentrates; Carisa, two carloads of ore; Sioux mill, two carloads of ore; Swansea, one carload of ore; South Swansea, five carloads of ore; North Star, three carloads of ore; Dragon Iron mine, one carload of ore daily.

The drift on the 100-foot level of the Triumph has run into ore, showing good assays.

B. M. Cornish has let a 100-foot contract for tunneling on the Empire Cons. group at Mt. Nebo.

The report to the effect that the Mammoth mine and mill will be shut down is a mistake, and that no such action is contemplated.

A new strike of ore has been made on the 650 level of the Swansea. The new strike shows greatly increased gold values.

Mercur *Mercury:* At La Cigale last week in grading for the mill on the Boston the heavy lime capping of what was supposed to be the footwall country was removed and it was found that underlying it was an immense body of ore at least 100 feet in width, all of which appears to be good milling ore.

Mercur *Miner:* Twelve or fourteen men are at work on the Wachusetts, and a contract has been let for doing a large amount of shaft and tunnel work.

Bingham *Bulletin:* About the 1st of June the Frisco will begin putting in machinery, consisting of a 40 H. P. engine, hoists, pumps, etc The main shaft of the mine is now 100 feet deep, and four drifts have been run from it. They are all showing first-class ore.

Another contract for 200 feet of the development work has been let on the Mohawk.

Eight carloads of lumber for the Highland Boy mill have been delivered and four more are at the depot.

The Heaston Brothers will soon start their water power jigs, probably on Montezuma and Julia Dean ore.

From five to seven carloads of ore are going out daily.

Work will be resumed in a few days on the Lone Tree adjoining the Frisco.

Silver City *Star:* A very fine showing of ore is reported in the Bull Domingo, encountered on the 200-foot level. The ore is rich in lead and silver and the vein varies from 4 inches to 2 feet in thickness.

A 2-foot body of ore was recently encountered in a crosscut from the 200-foot level of the Fissure mine.

A strike of ore was made on the 650-foot level of the Swansea last week in a drift being run to tap the ore directly beneath the stope on the 550-foot level.

Salt Lake *Tribune:* There are now 90,000 pounds of gilsonite on the road for the Culmer Bros. between here and the Pariett mines. They have let a contract to haul 1300 tons of lime-rock asphaltum from their Clear Creek mines to the railroad.

Five cars of stone are being daily shipped from the Kyune stone quarries, and it is claimed that the shipments will be kept up nearly all summer.

The coal mines at Castle Gate are at present only working about half time, and many of the miners are leaving the camp for other fields.

IDAHO.

Spokesman-Review: Within the territory drained by the two branches of the Cœur d'Alene river there are between 50 and 100 claims whose owners expect will be producing ore in paying quantities before the snows of another winter begin to fall.

At Wardner there will be little new work outside of that done by the Bunker Hill and Sullivan Mining and Milling Company. Most of the property in that neighborhood has passed into the possession of that company, and instead of a dozen mines that place will have one, monstrous in size, rapidly increasing its force and product.

At Wood river there are forty men at work on the Minnie Moore mine for Park City parties. It was at first understood that their operations were to be confined to the dump, but the water is to be cleared from the mine and the property worked.

Captain Day, of the Jessie mine, at Bellevue, proposes to build a mill that will reduce 75 to 100 tons of ore per day.

A. H. Boreman has taken a bond and lease of the Bullion and Mayflower, and has put about fifty men to work. These properties have each produced about $3,000,000, and it is believed they will again become dividend-payers under good management.

Mr. Boreman is working seventy-five men on the Jay Gould, which he purchased from "Deacon" White, the New York broker.

C. E. Towne reports that work will soon be started up on the Elmore mine, at Rocky Bar, by W. A. Clark, of Boston, the owner. The plan is to sink 300 feet and thoroughly explore the property.

MONTANA.

Butte *Miner:* The Hesperus Leasing Company will commence crosscutting on the Hesperus shaft, sunk by the Parrot Company, some time this week.

Manager Maginnis of the Montana Ore Purchasing Company states that the usual output from the Rarus and the Glengarry is keeping up, the latter mine supplying any curtailment in the output of the Rarus, caused by the injunction against working certain portions of the mine claimed by the Boston and Montana and Butte and Boston.

The deal for the transfer of the Mayflower group of mines, near Norris, has been consummated between A. G. Macdonald of Norris, the former owner, and Frank B. Turner and J. J. Broughall, of Butte, by which the latter acquire full title to the group of twelve claims. Development work will begin on the property at once.

WYOMING.

A strike of gold-bearing ore has been made ten miles east of Saratoga, in the foothills along Cedar creek, by prospectors. The lead can be traced for half a mile along the surface and shows from 6 inches to 4 feet in width.

COLORADO.

Republican: At Telluride all the principal mines are either being worked to their full capacity, or being put in condition for a large and constant production.

The Columbia-Menona mines and mills were started up full blast the first of this week and they will employ 125 to 150 men the rest of the year. The 30-stamp mill disposes of about 100 tons of ore a day.

It is believed that the Japan mines and concentrating plant will be started up within the next week or two, which will give employment to about 100 men.

The Tom Boy vein has not yet been cut by the mill tunnel crosscut, although it is in a distance of 1,900 feet, the length of the tunnel calculated, according to surveys, that would intersect it, but it may be that the vein has dipped more than figured on.

Development work is being prosecuted on the Grand View, lying on the mountain south of the Gold King mill, under the superintendency of C. A. Hallett.

At Cripple Creek some of the mill men of the camp are objecting to the agitation of the fact that the mines of the camp are being restricted in the production of mill ore for fear that mill building will be overdone and are looking forward to a time when the capacity in this line will exceed the supply of ore.

Tutt & Penrose are holding down the water in their leasing shaft on the Abe Lincoln in Poverty gulch and appear to be able to work on the ore reserves in spite of the properties which have shut down.

After working nine months and producing $78,000 gross value of ore, the Foley Leasing Company has been forced to turn back the Lillie on Legal Tender spur of Bull hill with $11,000 indebtedness for the owners to lift.

Barker, Andrews & Hall have let a contract for sinking a 100-foot shaft on the north end of the Elreno property on Gold hill on the new vein recently opened by lessees.

The Newell tunnel in Grouse mountain is making an average of 10 feet a day at present and is now 150 feet on its way.

The upraise on the Lelia vein from the Chicago-Cripple Creek tunnel, being run by John Nolen to develop a leased portion, is now in 12 feet of ore that gives average assays its full width.

The Bluebird Company has uncovered the best body of ore yet found in the mine in the fourth level from the old shaft.

McCourt & Burns will equip their 100-foot leasing shaft on the north end of the Burns of the Acacia Company with a new steam plant and push the shaft down an additional 100 feet. The vein is showing low values in body.

The ore has been located by the crosscut at 150 feet from the Sutphen shaft on the west end of the Yellowbird, and the grade found is equal to that in the level above.

The McKinley Gold Exploration Company of London has raised a treasury fund of $40,000 to be expended in developing its R. A. M. and Pessimist, and in patenting a number of properties on outlying hills.

At Victor McCourt and McCourt have disposed of the nine locations at McCourt camp on the Florence & Cripple Creek railroad to Kansas City parties who propose putting on a combination amalgamating and cyanide mill to handle the immense body of gold-bearing quartize that covers that section. Several attempts have been made in the past to handle the rock to a profit with stamp mills, but to no success.

In Gilpin county at Pine creek the Portland, in Elk park, has been leased and bonded to Burdis and Vickers of Colorado Springs for eighteen months for $25,000. The new parties will put up machinery and commence sinking.

Mike Cornwell is driving his St. Louis tunnel, at the mouth of Elk creek, and is now in over 200 feet, the drift at present showing a 20-inch streak of lead and yellow copper, which is being sacked.

Scott, Converse and Britton have resumed work on their Magnet tunnel, on Michigan hill, which at a distance in of 100 feet shows up encouragingly.

Prospectors are arriving daily in the Black canyon section, and work has been resumed on several properties during the past week.

Pennsylvania parties are interested in the Buckeye tunnel, which is in over 600 feet, and after some necessary work of retimbering the mouth of the tunnel active work will be started in this property.

In Boulder county the camps of Sunshine and Magnolia are in the tellurium and more men are at work in both places than at any time since the first discoveries were made.

ARIZONA.

Republican: At the Commonwealth Mining Company's property at Pearce the customary shipments of ore continue. The construction of the 60-ton mill is being pushed.

In the Dragoons the Black Diamond group of mines has been bonded to the Copper Queen Co. Prof. Ricketts, who is connected with the Copper Queen Co., will superintend the further development of the Black Diamond.

The Golden Rule mine, six miles south of Cochise station, has been sold to J. W. Bibbins of Philadelphia for $50,000, half in cash and balance in stock.

Russellville copper mine, west of Dragoon station, is being prospected by steam drill.

The Grand Reave mine in Arivaipa canyon, owned by Raum & Cunningham, has been bonded to a New York syndicate and work will be pushed on a large scale.

The Saginaw Mining Company is developing the Saginaw mines, nine miles south of Tucson, in a systematic manner, with a view to doing deep work. The ledge on the 50-foot level is 10 feet wide and between good walls. When ground is opened to supply sufficient ore they will erect a 300-ton concentrating plant and pump water from the river, three miles distant.

Three hundred men are now on the payroll of the Excelsior Mining Company. This number will probably be increased when the company has their plant in working order.

There is great excitement over a rich strike on the lower levels of the Tres Amigos gold mines at Oro Blanco. There is a 2-foot streak of high-grade ore.

At the Vulture mine the new owners took possession April 8. At present there are thirty-five men at work, seven miners keeping the 10-stamp mill busy. The great beds of tailings stretch for a mile through a wide ravine. It is estimated that there are 300,000 tons. A 100-ton cyanide plant is now being freighted from Fool's Gulch and a few months will see it in active operation here.

NEW MEXICO.

Silver City *Enterprise:* "At Hanover A. B. Laird has purchased the Cinque Senoras mine, Hanover gulch, and started work. A body of copper ore is opened.

At Santa Rita J. B. Gilchrist has thirty men working upon the Guadaloupe, Oxide and Chino mines. On the Gladaloupe the new Gilchrist shaft is down about 70 feet and shows a 3-foot vein of ore which runs 24 per cent copper.

At Mogollon the main adit level on the Confidence is in 1524 feet. The ore body in the breast of the tunnel is over 4 feet in width and is of much higher average grade than the ore milled during the past year. This new ore body in the breast of the main level is directly under a big outcrop of ore of the same grade which shows in an open cut upon the surface.

The Apache camp, in the Little Hatchet mountains, in the southern portion of Grant county, was in the early eighties a big producer of lead and copper ores, but the mines have been for some time dormant. About two months ago Weems & Anderson took a lease upon the Copper King mine. With a very small amount of development work they uncovered a large body of ore. With twelve men they are making regular shipments ranging from 160 to 200 tons per month.

J. D. Weems, one of the owners of the lease on the Copper King, has purchased from Gleason & Anderson one-third interest in the Gopher mine. Work was started last week and the mine has already become a producer. The ore body is from 6 to 16 feet in thickness.

At Pinos Altos the Treasure Mining Company have decreased the force of men at work in the mine until the new machinery being put up in the mill is in place, as the mine produces ore too rapidly for the storage capacity of the mill.

MEXICO.

(Special Correspondence).—The Compania Minera de Penoles at Mapimi, State of Durango, Mexico, have two large mines, smelting works, twenty miles of narrow-gauge railroad, electric light plant, telephone line, and have just finished the first rack railroad ever built in Mexico. Their headquarters are at Mapimi, where they have 400 acres of land enclosed by an adobe wall 12 feet high, inside of which is all of their plant. Outside of this is the Ferro-Carril Mapimi, which goes twenty-four kilometers, or fifteen miles to Estacion, Mapimi, on the Mexican Central Railroad. A branch runs from the smelter four miles to the pumping station at the foot of the hill, where is the shaft of the mine. The smelter's daily product is 550 bars of bullion, each weighing 85 pounds, mostly lead, containing a little silver and gold. The bars are shipped on the company's railroad to the Mexican Central to Tampico, thence to Hamburg.

The gauge of the railroad is thirty inches. It has cost a little over half a million dollars. There are four engines and forty-five cars. Nearly all the labor is native Mexican. The principal diet is tortillas, beans and coffee. One shaft is now sunk 1700 feet; another about 600 feet. From the former the production is about 150 tons of ore daily. Nearly 2000 people are in the employment of the company. Peons receive $1 a day at the mine and 75 cents at the smelter. Underground work is let to contractors, who make from $1.50 to $3 a day.

For nearly 300 years this mine has been worked by native Mexicans in a primitive manner. All the timber used here is brought from Texas and Florida and fitted in the shops of the smelting works.

Mapimi, Mexico, May 1, '97.

Scientific Progress.

Revolutionizing Plant Growth with Ether.

Consul Kirk, of Copenhagen, sends the following translation from Dannebrog of February 12, 1897, of an account of an interesting discovery in the physiology of plants.

Mr. Johannsen, lecturer at the Agricultural High School, delivered a lecture two evenings ago on the results so far obtained by the etherizing method, which consists in developing plants earlier than is normal to them by exposing them to the influence of ether fumes.

By exposing sleeping plants to the influence of ether and chloroform, the result is obtained that each plant, after the treatment with ether, begins to shoot; they have thus probably been awakened from their previous condition of sleep or inactivity. This sleep is due to a regular stoppage of activity, which causes the growth to cease.

Mr. Johannsen's first experiment was made with willow plants and next with bulbs and hyacinths. In the fall of 1894, he experimented with lilacs. As a result of these experiments, it was proved that the etherizing of the bulbs had no effect before the formation of the roots; the condition produced by the ether passed before the formation of the roots had advanced sufficiently to cause budding. Mr. Johannsen has also made some experiments with La Reine; the growth was considerable and the development of the bulb was in every respect satisfactory. The experiment was commenced on November 20 and on December 19 a part of the tulips were salable. The problem was solved as regards La Reine. It would, however, be of greater interest to produce lilies of the valley. The experiment in this direction in 1895 was promising, but the results this year were very poor.

Interesting and important are the experiments with ligneous plants. Lilacs grow splendidly when placed in an air-tight compartment and exposed forty-eight hours to the effect of 500 or 600 cubic centimeters of ether, and then placed in a hothouse. Just before Christmas, the plants had developed splendidly. The etherizing of the plants will cost 1 to 1½ cents each. The main point is to get the plants to shoot at any time before Christmas, even in September and October. Mr. Johannsen has had blooming lilacs on the 10th of September, but the plants did not develop regularly. It has, on the whole, been proved that the ether is not beneficial if applied before the middle of November.

The ether causes a derangement in the independence which should characterize each of the different stages of the plant. The development is not harmonious, owing to the too strong or too weak action of the ether. Mr. Johannsen will now try to gradually bring the plants to stand the action of the ether by giving them larger and larger doses. Experiments were made with certain seeds; for instance, the lupine grass and barley, and it was at once demonstrated that increasing doses of ether had a powerful effect. It is not so much the repetition of the ether which is the important point in the treatment, but its increasing application. The small and light doses of ether have a harmonizing and equalizing influence on the growth of germinating plants.

It can be said that some progress has undoubtedly been made, but no one can tell to what astonishing results this discovery may lead. Tulips, lilacs, etc., can be developed much earlier and have a pretty color and great durability, as the ether frees the plant of decomposable matter.

To etherize the plants, they are placed in an air-tight receptacle and exposed from twenty-four to ninety-six hours (generally forty-eight hours) to the influence of the ether. Cylindrical glasses are used for small plants, and for large plants an oil-painted box, the interior of which is lined with tin foil, 4 feet high and long and 2½ feet broad. On the lid a small hole is made, which is closed with a cork and the ether is conducted through this hole. As ether is very inflammable, great care must be taken not to bring candles or matches near it. The ether is dissolved at from 15° to 20° C.

Liquid Air an Agent of Research.

In beginning a course of lectures on "Liquid Air as an Agent of Research," at the Royal Institution in London last month, Professor Dewar said it was a mistake to suppose that the establishment of the various eryogenic laboratories that now existed in Europe was due to a desire merely to attain very low temperatures. Rather the desire was to investigate the conditions of gases of all temperatures and thus carry on the work of Faraday, Regnault, and Dr. Andrews of Belfast. The laws of Boyle and Charles, connecting together the volume, pressure and temperature of a gas, broke down as the liquid state was reached and indeed before, and for them Van der Waals, working on the careful measurements made by Andrews, proposed a new formula which connected the gaseous and liquid states. From this it was possible to calculate the critical temperature of a gas, above which no amount of pressure could liquefy it, and the work of Cailletet and others consisted in the experimental verification of the results thus obtained. Van der Waals also predicted that there would be found one isothermal line which would express the pressure, temperature and volume relations of all gases, and Amagat's work had confirmed this prediction. Referring to the difficulty of getting to very low temperatures, the lecturer said that if we had liquid hydrogen to-morrow we should still be a long way from the zero of absolute temperature and should have no conceivable way of reaching it. No liquefied gas could be utilized to produce a fall of temperature more than one-third to one-half its absolute critical range. Hence the lowest temperature that could be obtained by means of liquid hydrogen would still leave us some 20 degrees above the absolute zero. In the course of the experiments which occupied the rest of the lecture, Professor Dewar illustrated the application of extreme cold to the purpose of analysis by showing how with its aid certain constituents, such as ethylene and marsh-gas, could be separated out in a liquid form from a mixture of coal-gas. He also showed the extreme contraction produced by cold in gaseous and other bodies by cooling one end of a tube of ethylene, the other end being immersed in mercury. When the ethylene became liquid the mercury had risen in the tube substantially as high as in the barometer, proving the vapor pressure to be practically as small as in the Torricellian vacuum.

In his attempts to photograph flying bullets by the light of the spark, Prof. C. V. Boys has found that the double flash produced lasted somewhat less than the 100,000th of a second, giving only blurred pictures. He, therefore, shortened the spark. Instead of wire terminals, he used two very thick, broad bands of copper, not more than 2 inches long, which reached round opposite edges of the photographic plate in such a manner that a spark resulted when electric junction was effected by the passage of the bullet. The spark was thus shortened to about 1-13,000,000 of a second! In this time a bullet from an ordinary magazine rifle could not travel more than 1-500 of an inch, and good and sharp pictures were obtained.

For some time past there has been a tendency on the part of an increasing number of chemists to attack the problems of inorganic chemistry, profiting by the light which the study of organic chemistry has thrown upon the carbon and nitrogen atoms. This is an encouraging tendency from the standpoint of theoretical chemistry, for while the devotion of by far the largest proportion of chemists, for several decades down to the present time, to organic chemistry has widened vastly our knowledge of organic compounds and the carbon atom, yet the study of all other atoms is even more necessary for the theory of chemistry. Relatively very few inorganic compounds have been studied and some of our most familiar reactions are illy understood. So far from the inorganic field having been long ago worked out and exhausted, it is here that the chemistry of the future will find its most prolific harvest. Yet the field is far harder to till and less productive of immediate results.—Science.

Mechanical Progress.

The Use of Compressed Air for Mining Purposes.

NUMBER III.

A lecture delivered to the Engineering Students of the Leland Stanford Jr. University, May 3, 1897, by EDWARD A. RIX, M. Am. Soc. M. E.

To those who care to put thought on the subject of compressed air, I would suggest the subject of special motors and reheaters as a field offering both honor and remuneration. The advocates of compressed air would gain several points if they would pattern after the methods of electrical engineers, who have claimed from the very beginning that nothing was too good in the shape of material or machinery for the development of electrical power. The very finest and most efficient prime motors are always insisted upon, even down to insignificant plants, and the splendid construction of generators and installation of machinery and appurtenances, scracely without regard to cost, has enabled them to place their product upon a high engineering plane. Their methods and their ideas for the advancement of their interests have been correct and they are justly entitled to a commensurate reward.

How all this contrasts with the miserable class of compressed air machinery which until the last twelve months has been installed throughout the country! The very cheapest of slide valve engines, or some jumping, flapping belt for prime movers, poorly designed, poorly made compressors, with insufficient valve areas and cooling devices, generous clearances, enormous piston speeds, all and everything done to make a machine as cheap and undesirable as possible. For motors, anything that would reciprocate. The valve motions causing the pistons to meter out nicely the air in solid chunks at full pressure, the real work being done at the end of the exhaust pipe, and I might add that the louder the noise of escape the more work was supposed to be done in the cylinder, whereas in reality the air was simply making a louder protest at its misuse.

All this must change, and is changing, and an awakening is at hand. It is the duty of every pneumatic engineer to insist upon high class installations, not only for his personal success but for the advancement of compressed air: that most willing, useful and satisfactory power medium ever given to the service of mankind.

The requirements of the ordinary mine in this State, as far as power is concerned, may be enumerated as follows: Power for hoisting, for both surface and underground pumps, for rock drills, for milling and for lighting, for forge blasts and the mine whistle, which must be provided for some way, as it serves to mark the shift changes and give the fire or accident alarm.

I will take up each of these heads, briefly, speak of the prevailing practice here, and how it can be improved, and in any comparisons I may make between the efficiency of compressed air and any other power, I shall assume that the horse power in each kind of power costs the same ready to deliver to the various motors.

Before speaking of the various motors to develop the required power, we shall assume that our mine is properly equipped with air conduits and reheating apparatus. Too much stress cannot be laid upon the fact that generous air conduits on the surface and underground, properly provided with bends or elbows of large radius and properly insulated where they convey hot air, contribute greatly to the economical operation of an air plant.

While the actual loss to the compressed air in its potential, by the drop in pressure, caused by friction in small pipes, is not more than one-third of what the public believes it to be, still the annoyance in not getting initial pressure where small working cylinders are used, is great, and again the increased velocity in small pipes down a shaft deprives the compressed air of a gain instead of a loss of power as it goes downward, which it would have in proper sized conduits.

Illustrating the first point, it is generally assumed for instance, if a compressed air pipe receives air at 100 lbs., and delivers it at 80 lbs., that the loss is 20%, so it is in pressure, but relative pressures do not measure such a loss, for while the pressure has decreased, the volume has correspondingly increased, and the real loss is merely a frictional one of 8.4% instead of twenty.

Illustrating the second point, there is a very material gain to be had from the weight of air in average shafts, provided the pipes are of proper size. Air at 90 lbs. gauge on the surface would be 92 lbs. at 500 feet, 94 lbs. at 1000, 96 at 1500, and 98 at 2000 feet,—a gain sufficient to offset all frictions and ordinary leakage, a proportion which cannot be matched in electric-transmissions down a shaft.

Most of the air plants in our mines are inefficiently piped, and no attention whatever is paid to long bends, and the pipes in general appear to be specially installed to exhibit every class and variety of pipe fitting the market affords and with many duplicates. I have counted five 1-inch elbows in the space of 3 feet, to connect up a pump to the main air pipe, when the price of 1-inch hose and couplings would have been less and the hose would have delivered to the pump nearly the line pressure. The pressure loss in each of the 1-inch elbows would be (.005 V, 2), five thousandths of the square of the velocity of the air through the pipe. The pump had a 6-inch cylinder and the piston moved 50 feet per minute, the ratio of the cylinder area to the pipe being 1 to 36 the air in the pipe must move 1800 feet per minute, or 30 feet per second. This squared and multiplied by five one-thousandths makes a loss of 4½ lbs. for each elbow, or 22 lbs. for the five, certainly not a sensible or desirable result, yet one sees it everywhere in the mines. The passion miners have for 1-inch pipe is marvellous. One may frequently see strings of it 500 feet long, conveying air. It has cheapness and ease of installment to recommend it, but the wood pile and the owner suffer. A proper plant should have no 1-inch air pipe underground over 10 feet long, and no short elbows.

At some convenient place, where the total length of air conduits from the surface motors shall be a minimum, a good reheater should be established and connected to all these motors. There is ample scope to improve upon the reheater now upon the market. They may be classed as coil, tube and shell reheaters. The former, a simple or nest of coils within a furnace, the tube reheater consisting of a nest of pipes screwed into a cast iron head, and all surrounded by a furnace, the shell reheater made much like an ordinary domestic sheet iron heater, except that it will sustain pressure, the fire being within it.

Any of these will do fairly well, especially if well insulated on the outside to prevent surface radiation. They should be provided, in large plants, with pyrometer and proper dampers, to prevent over-heating. We build also a compound reheater, which contains two independent heating compartments for different pressures, the utility of which will be seen latter on.

A very small amount of fuel will be used in one of these reheaters,—just about half a cord of pine wood a day, to reheat 100 H. P. of cold air so that it will yield 140 H. P. When it is re-

membered that one-half a cord of pine wood will yield at the maximum 8 H. P. for 24 hours, when burned under a steam boiler, its capacity to produce 40 H. P. is little short of incredible. Besides doing this, it renders still further service by permitting us to use the compressed air in an expansion engine.

Some engineers use a steam boiler for a reheater, especially if it is already installed at the mine. A slow fire is maintained on the grates and about 80 to 90 lbs. steam pressure maintained, the compressed air bubbles up through the hot water, and mingles with the steam. Fully 90% of the mixture is air. This system has earnest advocates who claim that the latent heat of the condensing steam being released in the cylinder just where it is then needed, and the condensed water acting as a lubricant, make this system preferable. It is certain that the heat can be carried farther this way, but we lean to the classes of dry reheaters mentioned first, because they are simpler, will give higher temperatures, and require less fuel.

A temperature of 450° Fahr. can easily be maintained in the dry reheater, and with well insulated pipes this will insure 400° Fahr. to all motors contained within the ordinary hoisting works, with mill adjoining.

There should be installed at the end of the compressed air transmission pipe ample reservoir capacity. This is, next to reheating, the most important feature in a compressed air plant for mining work, and it is in the proper arrangement of this particular feature that we make a great gain in economy over electrical power for intermittent work.

The two sets of machines which take the most power around a mine are the rock drills and the hoists. These use large powers for short periods, and frequently the average power covering 24 hours is in the case of the hoist from one-third to one-fourth the maximum, and with rock drills about one-half where more than three machines are in use. It is evident, therefore, that if sufficient storage capacity be provided the average power will only be demanded from the transmission main, while in an electrical plant the maximum power must be continually delivered by the transmission, for it may be required at any moment. This makes it an expensive proposition to use electricity for intermittent work.

True storage batteries would accomplish the desired end, but who dares face their first cost and cost of maintenance.

(To be Continued.)

Electrical Progress.

Electric Light From the Heavens.

William A. Eddy, in his kite flying experiments at Bayonne, N. J., has lately made two interesting discoveries in relation to atmospheric electricity. As to the first, Mr. Eddy noticed that the fringe of a linen towel which hung beside the table at which he was working had been lifted up and stuck fast to the edge of the table. It has been the general belief of scientists that atmospheric electricity is not magnetic, but, acting upon the suggestion contained in the linen towel, Mr. Eddy has proved that it is at least capable of magnetizing soft iron. A small bar of iron was wrapped with four different kinds of wire, a layer of paraffine paper being placed around each layer. When connected with the electric current the iron was able to attract a bunch of heavy keys. By making use of this magnetic property it may be possible to produce continuous mechanical motion with an electric current drawn from the air, something that has not yet been done.

The second discovery was the production of electric light with a current drawn from the atmosphere. Mr. Eddy has in a second story room of his Bayonne home a most unique electric lighting plant. It is very simple in appearance, consisting only of a table containing half a dozen Leyden jars, one wire connecting with the kite apparatus, another with the ground, an electric switch, and an ordinary Edison incandescent lamp.

When the experimenter wishes to set his lighting plant in operation he sends up his tandem of kites to a height which varies according to weather conditions from 100 to 400 feet. Suspended from the kite string is the electric collector, which is simply a small wooden frame covered with tinfoil. From this collector a light wire is festooned down the kite string and enters the window There the current is controlled by an ordinary switch, across which it passes through the Leyden jars, thence through the electric lamp and off to the earth along a grounding wire.

For his first crude experiments Mr. Eddy has used an Edison incandescent lamp, with the carbon filament broken, to leave a space across which the current sparks. The wire leading from the electric collector is connected with one of the platinum wires leading into the lamp, and the grounding wire is connected with the other, thus completing the circuit. In this manner Mr. Eddy has been able to produce a faint but very clear and practically continuous light. Owing to his imperfect apparatus he has not yet been able to get one strong enough for the taking of X-ray photographs. "My next step," said Mr. Eddy, in speaking of his new achievement, "will be to construct a larger globe in which to place my wire, so that I can produce a larger spark. I believe that by using the ragged edges of metal I can obtain a 'brush,' and that by placing this in a vacuum tube I can produce a steady glow light. Equally important, too, it will be a cold light, the thing that experimenters have been working for in a number of different ways. Of course, the amount of atmospheric electricity that can be brought to earth is limited only by the size of the collector."

A DISPATCH from New York announces that the Manhattan Railway Company has finally decided to adopt electricity, and the system to be used is what is known as the "third rail." The success of the experiment on the New York and New England railway, which President Clark of the New Haven road predicted would result in revolutionizing travel on every railroad in the country, determined the system to be introduced on the elevated roads in that city, and at an early date the various electric companies will be invited to submit bids for equipping the entire system with the third rail. It is estimated that the change will require an outlay of $7,000,000. The saving that will accrue to the Manhattan Company from the change to the third-rail system of electricity is variously estimated from $750,000 to $1,000,000 a year. An illustrated account of the New York & New England electrical railway equipment will appear in the issue of June 5th.

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INDEX FOR
DIAMETERS AND DIAMETRAL PITCHES
OF
GEAR WHEELS

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P. T. TAYLOR & CO., SAN FRANCISCO, CAL.

Pitch	2½	3	4	5	6	8	10	12	14	16
Teeth	Pitch Dia.	Whole Dia.	Pitch Dia.	Whole Dia.	Pitch Dia.	Whole Dia.	Pitch Dia.	Whole Dia.	Pitch Dia.	Whole Dia.	Pitch Dia.	Whole Dia.	Pitch Dia.	Whole Dia.	Pitch Dia.	Whole Dia.	Teeth
10	4	4.8	3.2	3.6	2.5	2.9	2	2.4	1.667	2.067	1.429	1.829	1.25	1.65	1.111	1.511	10
11	4.4	4.8	3.52	3.92	2.75	3.15	2.2	2.6	1.833	2.233	1.571	1.971	1.375	1.775	1.222	1.622	11
12	4.8	5.2	3.84	4.24	3	3.4	2.4	2.8	2	2.4	1.714	2.114	1.5	1.9	1.333	1.733	12
13	5.2	5.6	4.16	4.56	3.25	3.65	2.6	3	2.167	2.567	1.857	2.257	1.625	2.025	1.444	1.844	13
14	5.6	6	4.48	4.88	3.5	3.9	2.8	3.2	2.333	2.733	2	2.4	1.75	2.15	1.556	1.956	14
15	6	6.4	4.8	5.2	3.75	4.15	3	3.4	2.5	2.9	2.143	2.543	1.875	2.275	1.667	2.067	15
16	6.4	6.8	5.12	5.52	4	4.4	3.2	3.6	2.667	3.067	2.286	2.686	2	2.4	1.778	2.178	16
17	6.8	7.2	5.44	5.84	4.25	4.65	3.4	3.8	2.833	3.233	2.429	2.829	2.125	2.525	1.889	2.289	17
18	7.2	7.6	5.76	6.16	4.5	4.9	3.6	4	3	3.4	2.571	2.971	2.25	2.65	2	2.4	18
19	7.6	8	6.08	6.48	4.75	5.15	3.8	4.2	3.167	3.567	2.714	3.114	2.375	2.775	2.111	2.511	19
20	8	8.4	6.4	6.8	5	5.4	4	4.4	3.333	3.733	2.857	3.257	2.5	2.9	2.222	2.622	20
21	8.4	8.8	6.72	7.12	5.25	5.65	4.2	4.6	3.5	3.9	3	3.4	2.625	3.025	2.333	2.733	21
22	8.8	9.2	7.04	7.44	5.5	5.9	4.4	4.8	3.667	4.067	3.143	3.543	2.75	3.15	2.444	2.844	22
23	9.2	9.6	7.36	7.76	5.75	6.15	4.6	5	3.833	4.233	3.286	3.686	2.875	3.275	2.556	2.956	23
24	9.6	10	7.68	8.08	6	6.4	4.8	5.2	4	4.4	3.429	3.829	3	3.4	2.667	3.067	24
25	10	10.4	8	8.4	6.25	6.65	5	5.4	4.167	4.567	3.571	3.971	3.125	3.525	2.778	3.178	25
26	10.4	10.8	8.32	8.72	6.5	6.9	5.2	5.6	4.333	4.733	3.714	4.114	3.25	3.65	2.889	3.289	26
27	10.8	11.2	8.64	9.04	6.75	7.15	5.4	5.8	4.5	4.9	3.857	4.257	3.375	3.775	3	3.4	27
28	11.2	11.6	8.96	9.36	7	7.4	5.6	6	4.667	5.067	4	4.4	3.5	3.9	3.111	3.511	28
29	11.6	12	9.28	9.68	7.25	7.65	5.8	6.2	4.833	5.233	4.143	4.543	3.625	4.025	3.222	3.622	29
30	12	12.4	9.6	10	7.5	7.9	6	6.4	5	5.4	4.286	4.686	3.75	4.15	3.333	3.733	30
31	12.4	12.8	9.92	10.32	7.75	8.15	6.2	6.6	5.167	5.567	4.429	4.829	3.875	4.275	3.444	3.844	31
32	12.8	13.2	10.24	10.64	8	8.4	6.4	6.8	5.333	5.733	4.571	4.971	4	4.4	3.556	3.956	32
33	13.2	13.6	10.56	10.96	8.25	8.65	6.6	7	5.5	5.9	4.714	5.114	4.125	4.525	3.667	4.067	33
34	13.6	14	10.88	11.28	8.5	8.9	6.8	7.2	5.667	6.067	4.857	5.257	4.25	4.65	3.778	4.178	34
35	14	14.4	11.2	11.6	8.75	9.15	7	7.4	5.833	6.233	5	5.4	4.375	4.775	3.889	4.289	35
36	14.4	14.8	11.52	11.92	9	9.4	7.2	7.6	6	6.4	5.143	5.543	4.5	4.9	4	4.4	36
37	14.8	15.2	11.84	12.24	9.25	9.65	7.4	7.8	6.167	6.567	5.286	5.686	4.625	5.025	4.111	4.511	37
38	15.2	15.6	12.16	12.56	9.5	9.9	7.6	8	6.333	6.733	5.429	5.829	4.75	5.15	4.222	4.622	38
39	15.6	16	12.48	12.88	9.75	10.15	7.8	8.2	6.5	6.9	5.571	5.971	4.875	5.275	4.333	4.733	39
40	16	16.4	12.8	13.2	10	10.4	8	8.4	6.667	7.067	5.714	6.114	5	5.4	4.444	4.844	40
41	16.4	16.8	13.12	13.52	10.25	10.65	8.2	8.6	6.833	7.233	5.857	6.257	5.125	5.525	4.556	4.956	41
42	16.8	17.2	13.44	13.84	10.5	10.9	8.4	8.8	7	7.4	6	6.4	5.25	5.65	4.667	5.067	42
43	17.2	17.6	13.76	14.16	10.75	11.15	8.6	9	7.167	7.567	6.143	6.543	5.375	5.775	4.778	5.178	43
44	17.6	18	14.08	14.48	11	11.4	8.8	9.2	7.333	7.733	6.286	6.686	5.5	5.9	4.889	5.289	44
45	18	18.4	14.4	14.8	11.25	11.65	9	9.4	7.5	7.9	6.429	6.829	5.625	6.025	5	5.4	45
46	18.4	18.8	14.72	15.12	11.5	11.9	9.2	9.6	7.667	8.067	6.571	6.971	5.75	6.15	5.111	5.511	46
47	18.8	19.2	15.04	15.44	11.75	12.15	9.4	9.8	7.833	8.233	6.714	7.114	5.875	6.275	5.222	5.622	47
48	19.2	19.6	15.36	15.76	12	12.4	9.6	10	8	8.4	6.857	7.257	6	6.4	5.333	5.733	48
49	19.6	20	15.68	16.08	12.25	12.65	9.8	10.2	8.167	8.567	7	7.4	6.125	6.525	5.444	5.844	49
50	20	20.4	16	16.4	12.5	12.9	10	10.4	8.333	8.733	7.143	7.543	6.25	6.65	5.556	5.956	50
51	20.4	20.8	16.32	16.72	12.75	13.15	10.2	10.6	8.5	8.9	7.286	7.686	6.375	6.775	5.667	6.067	51
52	20.8	21.2	16.64	17.04	13	13.4	10.4	10.8	8.667	9.067	7.429	7.829	6.5	6.9	5.778	6.178	52
53	21.2	21.6	16.96	17.36	13.25	13.65	10.6	11	8.833	9.233	7.571	7.971	6.625	7.025	5.889	6.289	53
54	21.6	22	17.28	17.68	13.5	13.9	10.8	11.2	9	9.4	7.714	8.114	6.75	7.15	6	6.4	54
55	22	22.4	17.6	18	13.75	14.15	11	11.4	9.167	9.567	7.857	8.257	6.875	7.275	6.111	6.511	55
56	22.4	22.8	17.92	18.32	14	14.4	11.2	11.6	9.333	9.733	8	8.4	7	7.4	6.222	6.622	56
57	22.8	23.2	18.24	18.64	14.25	14.65	11.4	11.8	9.5	9.9	8.143	8.543	7.125	7.525	6.333	6.733	57
58	23.2	24	18.56	18.96	14.5	14.9	11.6	12	9.667	10.067	8.286	8.686	7.25	7.65	6.444	6.844	58
59	23.6	24.4	18.88	19.28	14.75	15.15	11.8	12.2	9.833	10.233	8.429	8.829	7.375	7.775	6.556	6.956	59
60	24	24.8	19.2	19.6	15	15.4	12	12.4	10	10.4	8.571	8.971	7.5	7.9	6.667	7.067	60
61	24.4	25.2	19.52	19.92	15.25	15.65	12.2	12.6	10.167	10.567	8.714	9.114	7.625	8.025	6.778	7.178	61
62	24.8	25.6	19.84	20.24	15.5	15.9	12.4	12.8	10.333	10.733	8.857	9.257	7.75	8.15	6.889	7.289	62
63	25.2	26	20.16	20.56	15.75	16.15	12.6	13	10.5	10.9	9	9.4	7.875	8.275	7	7.4	63
64	25.6	26.4	20.48	20.88	16	16.4	12.8	13.2	10.667	11.067	9.143	9.543	8	8.4	7.111	7.511	64
65	26	26.8	20.8	21.2	16.25	16.65	13	13.4	10.833	11.233	9.286	9.686	8.125	8.525	7.222	7.622	65
66	26.4	27.2	21.12	21.52	16.5	16.9	13.2	13.6	11	11.4	9.429	9.829	8.25	8.65	7.333	7.733	66
67	26.8	27.6	21.44	21.84	16.75	17.15	13.4	13.8	11.167	11.567	9.571	9.971	8.375	8.775	7.444	7.844	67
68	27.2	28	21.76	22.16	17	17.4	13.6	14	11.333	11.733	9.714	10.114	8.5	8.9	7.556	7.956	68
69	27.6	28.4	22.08	22.48	17.25	17.65	13.8	14.2	11.5	11.9	9.857	10.257	8.625	9.025	7.667	8.067	69
70	28	28.8	22.4	22.8	17.5	17.9	14	14.4	11.667	12.067	10	10.4	8.75	9.15	7.778	8.178	70
71	28.4	29.2	22.72	23.12	17.75	18.15	14.2	14.6	11.833	12.233	10.143	10.543	8.875	9.275	7.889	8.289	71
72	28.8	29.6	23.04	23.44	18	18.4	14.4	14.8	12	12.4	10.286	10.686	9	9.4	8	8.4	72
73	29.2	30	23.36	23.76	18.25	18.65	14.6	15	12.167	12.567	10.429	10.829	9.125	9.525	8.111	8.511	73
74	29.6	30.4	23.68	24.08	18.5	18.9	14.8	15.2	12.333	12.733	10.571	10.971	9.25	9.65	8.222	8.622	74
75	30	30.8	24	24.4	18.75	19.15	15	15.4	12.5	12.9	10.714	11.114	9.375	9.775	8.333	8.733	75
76	30.4	31.2	24.32	24.72	19	19.4	15.2	15.6	12.667	13.067	10.857	11.257	9.5	9.9	8.444	8.844	76
77	30.8	31.6	24.64	25.04	19.25	19.65	15.4	15.8	12.833	13.233	11	11.4	9.625	10.025	8.556	8.956	77
78	31.2	32	24.96	25.36	19.5	19.9	15.6	16	13	13.4	11.143	11.543	9.75	10.15	8.667	9.067	78
79	31.6	32.4	25.28	25.68	19.75	20.15	15.8	16.2	13.167	13.567	11.286	11.686	9.875	10.275	8.778	9.178	79
80	32	32.8	25.6	26	20	20.4	16	16.4	13.333	13.733	11.429	11.829	10	10.4	8.889	9.289	80
81	32.4	33.2	25.92	26.32	20.25	20.65	16.2	16.6	13.5	13.9	11.571	11.971	10.125	10.525	9	9.4	81
82	32.8	33.6	26.24	26.64	20.5	20.9	16.4	16.8	13.667	14.067	11.714	12.114	10.25	10.65	9.111	9.511	82
83	33.2	34	26.56	26.96	20.75	21.15	16.6	17	13.833	14.233	11.857	12.257	10.375	10.775	9.222	9.622	83
84	33.6	34.4	26.88	27.28	21	21.4	16.8	17.2	14	14.4	12	12.4	10.5	10.9	9.333	9.733	84
85	34	34.8	27.2	27.6	21.25	21.65	17	17.4	14.167	14.567	12.143	12.543	10.625	11.025	9.444	9.844	85
86	34.4	35.2	27.52	27.92	21.5	21.9	17.2	17.6	14.333	14.733	12.286	12.686	10.75	11.15	9.556	9.956	86
87	34.8	35.6	27.84	28.24	21.75	22.15	17.4	17.8	14.5	14.9	12.429	12.829	10.875	11.275	9.667	10.067	87
88	35.2	36	28.16	28.56	22	22.4	17.6	18	14.667	15.067	12.571	12.971	11	11.4	9.778	10.178	88
89	35.6	36.4	28.48	28.88	22.25	22.65	17.8	18.2	14.833	15.233	12.714	13.114	11.125	11.525	9.889	10.289	89
90	36	36.8	28.8	29.2	22.5	22.9	18	18.4	15	15.4	12.857	13.257	11.25	11.65	10	10.4	90
91	36.4	37.2	29.12	29.52	22.75	23.15	18.2	18.6	15.167	15.567	13	13.4	11.375	11.775	10.111	10.511	91
92	36.8	37.6	29.44	29.84	23	23.4	18.4	18.8	15.333	15.733	13.143	13.543	11.5	11.9	10.222	10.622	92
93	37.2	38	29.76	30.16	23.25	23.65	18.6	19	15.5	15.9	13.286	13.686	11.625	12.025	10.333	10.733	93
94	37.6	38.4	30.08	30.48	23.5	23.9	18.8	19.2	15.667	16.067	13.429	13.829	11.75	12.15	10.444	10.844	94
95	38	38.8	30.4	30.8	23.75	24.15	19	19.4	15.833	16.233	13.571	13.971	11.875	12.275	10.556	10.956	95
96	38.4	39.2	30.72	31.12	24	24.4	19.2	19.6	16	16.4	13.714	14.114	12	12.4	10.667	11.067	96
97	38.8	39.6	31.04	31.44	24.25	24.65	19.4	19.8	16.167	16.567	13.857	14.257	12.125	12.525	10.778	11.178	97
98	39.2	40	31.36	31.76	24.5	24.9	19.6	20	16.333	16.733	14	14.4	12.25	12.65	10.889	11.289	98
99	39.6	40.4	31.68	32.08	24.75	25.15	19.8	20.2	16.5	16.9	14.143	14.543	12.375	12.775	11	11.4	99
100	40	40.8	32	32.4	25	25.4	20	20.4	16.667	17.067	14.286	14.686	12.5	12.9	11.111	11.511	100
101	40.4	41.2	32.32	32.72	25.25	25.65	20.2	20.6	16.833	17.233	14.429	14.829	12.625	13.025	11.222	11.622	101
102	40.8	41.6	32.64	33.04	25.5	25.9	20.4	20.8	17	17.4	14.571	14.971	12.75	13.15	11.333	11.733	102
103	41.2	42	32.96	33.36	25.75	26.15	20.6	21	17.167	17.567	14.714	15.114	12.875	13.275	11.444	11.844	103
104	41.6	42.4	33.28	33.68	26	26.4	20.8	21.2	17.333	17.733	14.857	15.257	13	13.4	11.556	11.956	104
105	42	42.8	33.6	34	26.25	26.65	21	21.4	17.5	17.9	15	15.4	13.125	13.525	11.667	12.067	105
106	42.4	43.2	33.92	34.32	26.5	26.9	21.2	21.6	17.667	18.067	15.143	15.543	13.25	13.65	11.778	12.178	106
107	42.8	43.6	34.24	34.64	26.75	27.15	21.4	21.8	17.833	18.233	15.286	15.686	13.375	13.775	11.889	12.289	107
108	43.2	44	34.56	34.96	27	27.4	21.6	22	18	18.4	15.429	15.829	13.5	13.9	12	12.4	108
109	43.6	44.4	34.88	35.28	27.25	27.65	21.8	22.2	18.167	18.567	15.571	15.971	13.625	14.025	12.111	12.511	109
110	44	44.8	35.2	35.6	27.5	27.9	22	22.4	18.333	18.733	15.714	16.114	13.75	14.15	12.222	12.622	110
111	44.4	45.2	35.52	35.92	27.75	28.15	22.2	22.6	18.5	18.9	15.857	16.257	13.875	14.275	12.333	12.733	111
112	44.8	45.6	35.84	36.24	28	28.4	22.4	22.8	18.667	19.067	16	16.4	14	14.4	12.444	12.844	112
113	45.2	46	36.16	36.56	28.25	28.65	22.6	23	18.833	19.233	16.143	16.543	14.125	14.525	12.556	12.956	113
114	45.6	46.4	36.48	36.88	28.5	28.9	22.8	23.2	19	19.4	16.286	16.686	14.25	14.65	12.667	13.067	114
115	46	46.8	36.8	37.2	28.75	29.15	23	23.4	19.167	19.567	16.429	16.829	14.375	14.775	12.778	13.178	115
116	46.4	47.2	37.12	37.52	29	29.4	23.2	23.6	19.333	19.733	16.571	16.971	14.5	14.9	12.889	13.289	116
117	46.8	47.6	37.44	37.84	29.25	29.65	23.4	23.8	19.5	19.9	16.714	17.114	14.625	15.025	13	13.4	117
118	47.2	48	37.76	38.16	29.5	29.9	23.6	24	19.667	20.067	16.857	17.257	14.75	15.15	13.111	13.511	118
119	47.6	48.4	38.08	38.48	29.75	30.15	23.8	24.2	19.833	20.233	17	17.4	14.875	15.275	13.222	13.622	119
120	48	48.8	38.4	38.8	30	30.4	24	24.4	20	20.4	17.143	17.543	15	15.4	13.333	13.733	120
121	48.4	49.2	38.72	39.12	30.25	30.65	24.2	24.6	20.167	20.567	17.286	17.686	15.125	15.525	13.444	13.844	121
122	48.8	49.6	39.04	39.44	30.5	30.9	24.4	24.8	20.333	20.733	17.429	17.829	15.25	15.65	13.556	13.956	122
123	49.2	50	39.36	39.76	30.75	31.15	24.6	25	20.5	20.9	17.571	17.971	15.375	15.775	13.667	14.067	123
124	49.6	50.4	39.68	40.08	31	31.4	24.8	25.2	20.667	21.067	17.714	18.114	15.5	15.9	13.778	14.178	124
125	50	50.8	40	40.4	31.25	31.65	25	25.4	20.833	21.233	17.857	18.257	15.625	16.025	13.889	14.289	125
126																	126

TABLE OF DECIMAL EQUIVALENTS
Of Inches, Halves, Thirds, and Sixths of an Inch.

Plain Rules on Gearing.

The word "diameter" when applied to gears is always understood to mean the pitch diameter.

The diametral pitch of a gear is the number of teeth in each inch of its pitch diameter.

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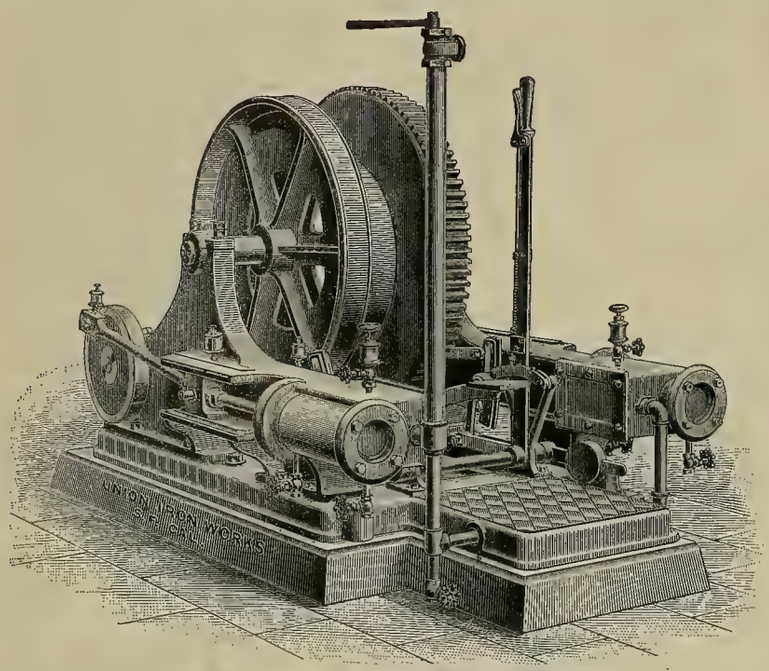


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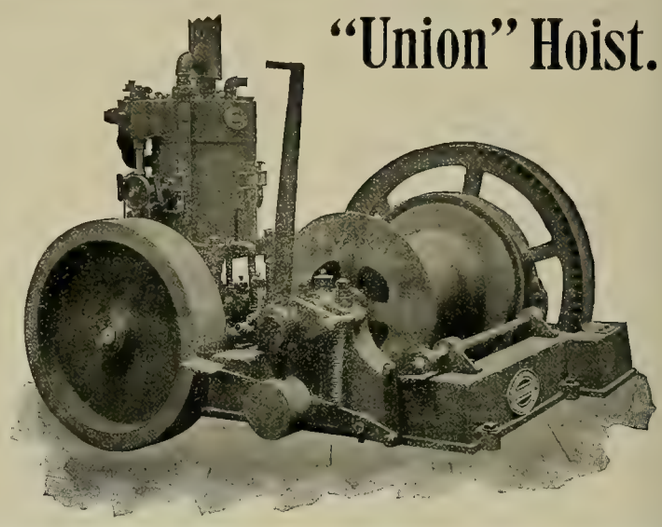
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Coast Industrial Notes.

—The new ice plant at Redding, California, with a daily capacity of 6½ tons, has been started up.

—A survey will begin in a few days for a proposed railroad from Nevada City, Cal., to Marysville.

—There is a proposition on foot to light the town of Quincy, Plumas county, California, with electricity.

—The S. P. Co. by land and the O. R. & N. Co. by sea are again cutting rates between S. F. and Portland, Or.

—It is expected that the Hawaiian reciprocity clause will be restored in the Dingley tariff bill by the Senate.

—Surveyors are working on the line of the proposed twenty-six miles of railway between Randsburg and Kramer, Cal.

—Labor Commissioner Fitzgerald closes today the free employment department of the State Labor Bureau, the appropriation being exhausted.

—The trustees of the Mechanics' Institute have invited the co-operation of Manufacturers' and Producers' Association to make the coming exhibition a pure food fair.

—The Standard Oil Co. has effected an arrangement with the Union Oil Co. of Ventura, Cal., securing immunity from competition for five years, with the probable result of higher prices.

—The preliminary survey of the Bedlington & Nelson Railway, in British Columbia, has been begun. The survey is being made for the company incorporated by the last Provincial Legislature.

—The recent governmental ruling that passengers could not be carried on vessels using gasoline for motive power has been set aside and gasoline boats can continue to carry passengers under license.

—The Sierra Railway Company have thirteen miles of track from Oakdale, Cal., twenty miles are graded, and by June 15th the company will be able to receive and discharge freight at Smith's, twenty-one miles from Oakdale.

—The San Gabriel Electric Company is formed to acquire and sell power for application to mechanical and other devices. M. Weed, C. Allen, J. D. Wiley, J. A. Elliott, S. J. Chase, Los Angeles; capital stock, $500,000; subscribed, $25,000.

—Electricians report to the Sacramento, Cal., trustees that that city can have municipal electric lights for $7.84 per arc light per month, the cost of the entire plant to be $63,658.14. The Capital City is also figuring on a sewer plan to cost $120,000.

—The low value of a horse in California is in sharp contrast with the price of one in Alaska, the equine freight for a part of the way there being 4 cents a pound. Dogs, of which there are a multitude in California, are worth from $20 to $50 each in Alaska.

—The value of the pearls found in the waters about Lower California last year was $300,000. From this peninsula 5000 tons of pearl shells were shipped, valued at $1,250,000. Many black pearls are found in those waters, and these have a greater value than the white. The pearls are exported direct to London and Paris.

—Last Saturday the Folsom and Sacramento Highway Commission met. C. A. Luhrs was elected president, C. T. Hughes secretary, J. L. Maude engineer. The macadamized roadway will be 20 feet wide, extending from Sacramento to Folsom, twenty-two miles, and will cost about $90,000.

—Word comes from Tehachapi that two parties of surveyors are at work in the Tehachapi mountains surveying a line of railroad through Tejon Pass, and considerable speculation is being indulged in in consequence as to the identity of the railroad company that is doing the work. There is indication that the survey is being made by the Santa Fe road, for recent events in the affairs of that company would seem to show that it intends to reach out for California traffic more than it has in the past.

—Secretary of War Alger has made a response to the Senate resolution calling for a statement as to what has been or is about to be done with reference to making contracts for the improvement of San Pedro harbor, California. The Secretary submits the whole subject to Congress for further instructions as to its purpose—whether to create simply a harbor of refuge or one for refuge and commerce—and states that the breakwater alone would absorb the whole appropriation of $2,950,000. The cost of all the work contemplated he estimates will require over $5,000,000.

—The San Francisco and San Joaquin Valley Railroad has been completed to Hanford, and trains were run to that place last Saturday. Chief Engineer Storey, at that time, said in an interview: "The Valley road will push on to Bakersfield. It is reasonable to suppose that some transcontinental line will build to Bakersfield and give us connection through to the East. We can then handle transcontinental freight. In the meantime, we undertake to perform only what we set out to perform—that is, to grant relief in the matter of local rates, which bear the heaviest on the farmers."

Obituary.

On the 15th inst. a prospector found the dead body of Ed Schieffin in his cabin, 22 miles from Canyonville, Or. His faithful dog guarded the body. The verdict of the coroner's jury was death from natural causes. Deceased was noted as the discoverer of Tombstone district, Arizona. He was a born prospector, a true comrade, and this brief chronicle of his death will be read with regret by many.

Personal.

George W. Grayson is at Baker City, Oregon, visiting the Virtue mine, which he owns.

Charles B. Boothe of Los Angeles returned from the East this week via San Francisco.

J. F. Herrick was last week appointed manager of the Iron Mask mine at Rossland, B. C.

Prince Louis of Savoy sailed from Southampton last Saturday with the companions who are to attempt the ascent of Mount St. Elias in Alaska. The mountain is 18,000 feet high. The party includes four Alpine guides.

J. J. Crawford, ex-State Mineralogist of California has resumed the practice of his profession of mining and hydraulic engineering, and makes his headquarters at the Mining Bureau. After August 1 he will be in the new Claus Spreckels building, where he has engaged offices on the tenth floor.

At the annual convention of the Western Federation of Miners, held in Salt Lake, the following officers were elected: President, E. Boyce, Wallace, Idaho; vice-president, J. F. McDonell, Virginia City, Nev.; executive board—E. Boyce; W. Walsh, A. Sholin, Butte, Mont.; R. S. Lyons, Free Coinage, Colo.; A. Morton, Land Conlac, Mont.; J. J. Frier, Lead City, South Dakota.

The Miners' Association of southern Oregon has enlarged its executive committee from eight to fifteen. The members now are William H. Hampton, H. A. Shorey, L. L. Jewell, Frank M. South, J. W. Robinson, George Lyman, J. D. Cook, George W. Lance Jr., H. A. Corless, L. Savage, W. F. Hull, A. M. Brown, F. Niday, John Bolt, P. H. Harth, N. P. Dodge, J. L. Calvert.

Recent California Mining Incorporations.

Sunset Mining and Milling Company, San Francisco; E. and F. Happersberger, J. T. Ish, E. Meyer, C. F. Humphrey, F. F. Cooper; capital stock, $5,000; all subscribed.

Manitou Mining Company, Vallecito, Cal.; A. Lundberg, W. Moyle, Vallecito; F. J. Solinsky, J. B. Luddy, San Andreas; E. Hebard, Soulsbyville; capital stock, $100,000; subscribed, $25.

Oro Minto G. M. Co., S. F.; A. R. Smith, N. King, C. R. Alberger, San Francisco; F. J. Baker, G. L. Dillman, Sausalito; capital stock, $250,000; subscribed, $25.

Garibaldi M. & D. Co., S. F.; C. H. and T. F. Fish, H. G. Blasdell, W. E. F. Deal, J. Stadfeld, Jr.; capital stock, $1,000,000; $5000 subscribed.

Radical G. M. Co., S. F.; W. C. Wright, W. H. Foster, S. N. Parson, D. and W. C. Mackintosh; capital stock, $1,000,000; subscribed, $2500.

Big Oak Flat G. M. Co., S. F.; F. L. Fisher, G. S. McPhee, B. C. Rucker, D. Corcoran, S. Berwin; capital stock, $100,000; subscribed, $25.

Granite State M. & D. Co., Washington, Cal.; J. A. Gleason, C. Thornton, W. H. Mead, H. J. Wright, J. J. Jones; capital stock, $1,000,000; subscribed, $50,000.

Books Received.

Pacific Coast Gold Mining Directory." Mines, mine owners, etc., of the Coast, by counties and towns in California, with routes of travel, distance, rates of fare, etc., published by A. R. Dunbar & Co., 421 Market street, San Francisco; price $5.

"*The Mechanical Arts Simplified,*" with an appendix containing an electrical department, a treatise on ice making, and a collection of miscellaneous practical examples; illustrated, 480 pages. A book of reference for architectural iron workers, blacksmiths, boiler makers, contractors; civil, mechanical, mining, marine engineers; firemen, master mechanics, machine shop proprietors, machinery salesmen, machinists, pattern makers, railway superintendents, etc. In silk cloth, gold stamp, $2.50. Sent postpaid on receipt of price by the publishers, Laird & Lee, 263 Wabash avenue, Chicago, Ill.

"*The Gold Quartz Veins of Nevada City and Grass Valley Districts, California,*" by Waldemar Lindgren. This work is one of the most valuable contributions ever made to the economic geology of this State. Some time ago extracts from the description of the geologic atlas, published in a folio by the United States Geological Survey, and written by Mr. Lindgren, were published in the Mining and Scientific Press. This work, a volume of 250 pages, with many valuable and beautiful illustrations and maps, deals particularly with the economic side of the geology of the district and the hydrography. So long as the United States Geological Survey continues to turn out such good work it should have better support from Congress. Copies may be obtained, as long as the edition lasts, by addressing Director United States Geological Survey, Washington, D. C.

Recently Declared Mining Dividends.

Hope Mining Company, Glendale, Montana, $10,000; payable May 1; a total to date of $682,250.

Mercury, Utah, $25,000; payable May 20.

Homestake Mining Company, Deadwood, South Dakota, $31,250; payable May 25.

The Victor mine at Cripple Creek, Colorado, which passed its monthly dividend for April, will hereafter pay dividends quarterly.

New Idria Quicksilver Mining Co., California, $10,000; payable June 10.

Etna Consolidated Quicksilver Mining Co., California, $10,000; payable June 10.

Commercial Paragraphs.

Williamson & Cheney of Boulder, Colo., have put in a Hendrie & Bolthoff double friction hoist at their property in the Eldora district.

C. M. Walker of Denver, Colo., has patented the Walker '97 Rock Drill, which will be manufactured in Denver. A distinctive feature of the machine is said to be in the saving of power.

Geo. E. Truax of the Truax Manufacturing Co. of Denver, Colo., is the inventor and patentee of a mine windlass, by action of which an ore bucket is automatically landed without pulling it from over the shaft.

The Gold Medal mine of Idaho Springs, Colo., has just started up a new 8x10 geared hoist, which was made by the Vulcan Iron Works Co. of Denver, which has also shipped a plant of machinery to the Falu mine at Idaho Springs.

A gear index chart published by P. T. Taylor & Co.'s Gear Cutting Shop, 523-525 Mission St., will be found useful and convenient for all machinists. It is printed on heavy check board 14x22 and will be sent free upon application.

The Ingersoll-Sergeant Drill Co., Havemeyer building, New York City, have issued catalogue 72, "Water Pumped by Compressed Air," which describes the Pohle air lift system, its operation and technical working, and the advantages of pumping water by compressed air. It also illustrates methods of well piping, gives results of the air lift system at various places, including the operation of steam piston pumps by compressed air. The catalogue is illustrated with halftones, sectional views, etc. Parke & Lacy Co., 21 and 23 Fremont street, San Francisco, are the local agents.

Fraser & Chalmers, Chicago, have built a 2-stamp mortar with screen openings on all four sides, no copper plates inside of the mortar and no chuck blocks, the object being to get the pulp out of the mortar as rapidly as possible, and to accomplish this purpose the top of the die is kept well up to the screen opening and the stamps are run at 100 drops a minute, having a weight of 950 pounds each. In order to bring the ore in contact with copper plates and amalgamate the ore as much as possible without excessively long tables, the sluices and lips of the mortar on all four sides are lined with copper plates, electroplated. To facilitate the cleaning of copper plates in the side sluices of the mortar the distance between the battery posts is made 4 feet 6 inches. The posts themselves are the regulation width, 12 inches.

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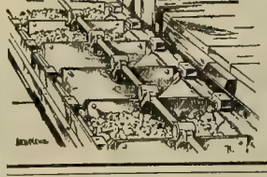
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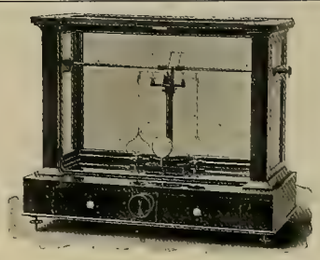
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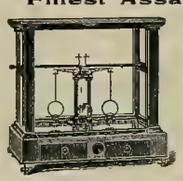
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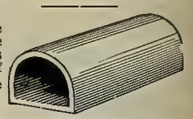


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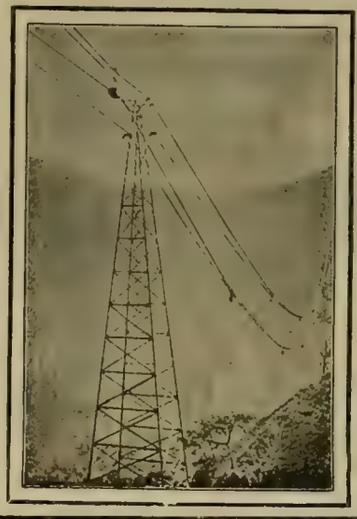
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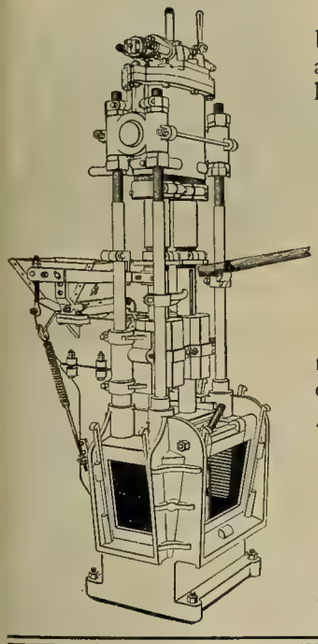
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List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING MAY 18, 1897.

582,609.—MACHINE FOR AFFIXING STAMPS.—Aldrich & Dinsmoor, Portland, Or.
582,612.—ERASER—J. D. Barrie, Los Angeles, Cal.
583,012.—POT LIFTER—C. E. Campbell, Portland, Or.
582,847.—SASH HINGE—R. G. Coates, Pasadena, Cal.
582,732.—LOGGING APPARATUS—G. S. Fouts, S. F.
582,258.—HEATER—A. A. Graham, Spokane, Wash.
582,644.—BOTTLE SEAL—Heath & Nagell, Tacoma, Wash.
582,919.—CRATE BUFFER—J. S., A. J. & N. Hodge, Pasadena, Cal.
582,745.—AMALGAMATOR—F. G. Jordan, Spokane, Wash.
582,826.—GATE—L. Lundquist, Middletown, Cal.
582,755.—TONGS—W. B. Marble, Laytonville, Cal.
582,669.—CONCENTRATOR—J. McKinnon, Colfax, Wash.
582,966.—CUTTER FOR HAY STACKS—H. J. Twiss, Baker City, Or.
582,769.—BEER BOTTLING APPARATUS—H. Wank, Portland, Or.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time.

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

SECURING OBJECTS FROM SUBAQUEOUS BOTTOMS.—Wm. McGregor, B. C. No. 582,828. Dated May 18, 1897. This invention relates to means for securing materials and objects from bottoms under water. It consists of a vessel adapted to be lowered into the water, a valve in said vessel and a frangible cap or cover forming a closure for the lower end of the vessel and temporarily excluding the vessel therefrom and, when broken, permitting the water under its pressure to rush into the vessel and carry objects and materials from the bottom with it into the vessel. The object is to secure materials and substances lying at a depth below the surface, such as samples of a subaqueous bottom, or prospecting for precious metals or stones or other objects which may be dropped or lost therein accidentally, and is especially useful in recovering diamonds which may be dropped from the crown-heads of diamond drills, or metallic pieces or objects broken from boring tools or dropped into the hole where drilling or similar work is being done.

GATE.—Levi Lundquist, Middletown, Cal. No. 582,826. Dated May 18, 1897. This invention relates to the class of gates which are adapted to be opened and closed by the approaching or receding traveler without his alighting from his conveyance, and its object is to provide means for opening and closing the gate, and at the same time operating the lock or latch thereof. It consists of an overhead track; rollers by which the gate is suspended so as to travel on the track; a catch lug fixed in the upper part of the gate with a gravity latch bar hanging from the overhead track adapted to engage the catch lug; a swinging lifter carried by the gate and adapted to operate under the latch bar to lift it from its engagement and free the gate; ropes or lines connected with the lifter for both freeing and sliding the gate open and also for closing it, these being connected to posts on opposite sides of the roadway at a sufficient distance from the gate to be operated by the approaching or receding traveler.

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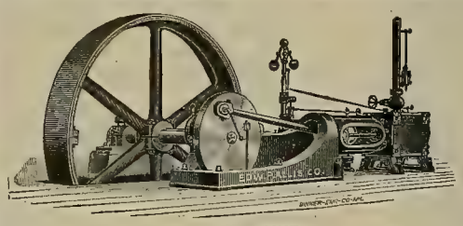
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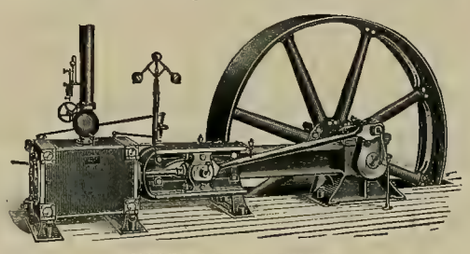
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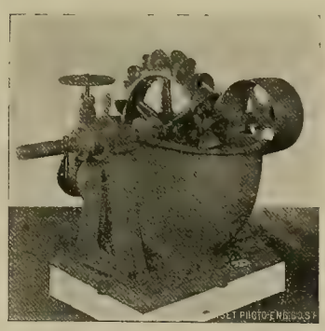
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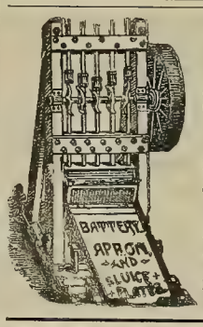
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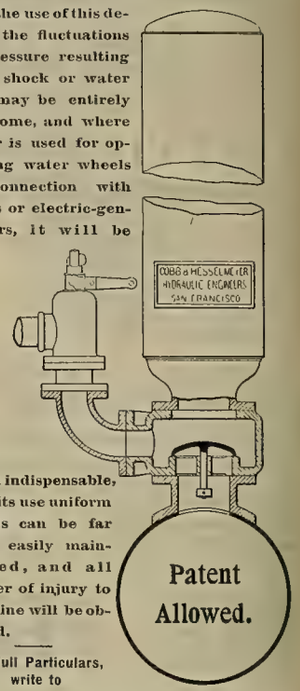


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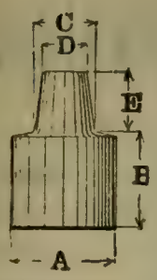
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B=..... "
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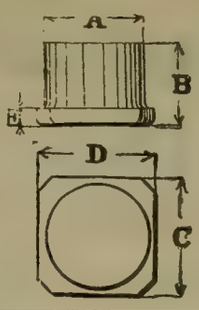
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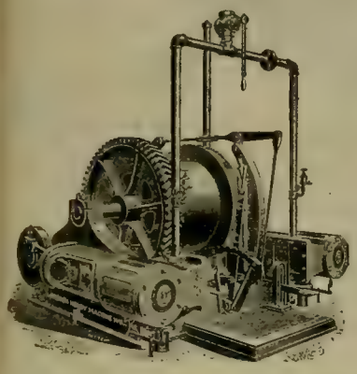
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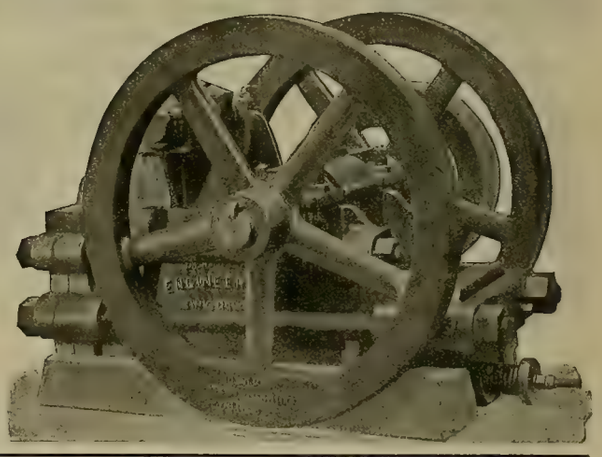
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Automatic Ore Cars.
THEY ARE THE BEST AND CHEAPEST.
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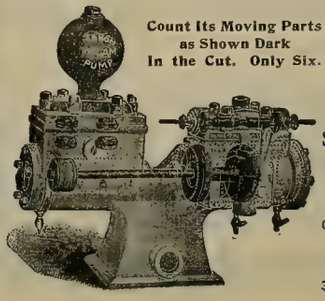


Pat. Jan. 5, '92, Aug. 2, '95. *Send for Catalogue.* Sacramento, California.

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THE WEIGELE PIPE WORKS,
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MARSH STEAM PUMP.



Count Its Moving Parts as Shown Dark In the Cut. Only Six.

ABSOLUTE ACTUATION AND REGULATION.
PATENT SELF-GOVERNING STEAM VALVE.
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NO OUTSIDE VALVE GEAR.

Maximum of Strength, Simplicity and Service.
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Simonds Saws. Dodge Wood Split Pulleys.

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EXCEEDS that of any other manufacturer in the United States, and Includes Everything in the Electrical Line. . . . . .

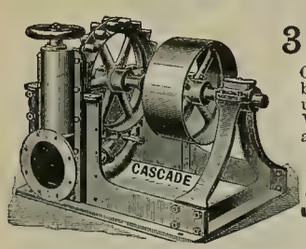
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TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

3 Feet to 2000 Feet.



Our experience of 33 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

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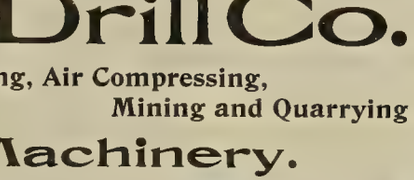
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Just Listen—Reliable Common Sense Steel Whim, price reduced to $100. Steam Hoisters, $300 and up; hand hoisters $30; steel ore buckets all prices; prospectors' stamp mills $300. A 10-stamp mill, new, 850 lb. stamps, high mortars, latest improved. Only $800.





Ores tested and amalgamation and concentration mills built to fit the ore and guaranteed to save what we say. Coal Mine equipments, Screens, Jigs, Tramways, Arastors, Chillian Mills, Ore Sacks, etc. Cornish Rolls, 12x20, weight 6,000 lbs., price $350; Feeders, Bumping Tables; Blake Crushers, 7x10, weight 8,100 lbs, only $250. Our 100 page illustrated catalogue FREE.

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Portable Saw Mills.

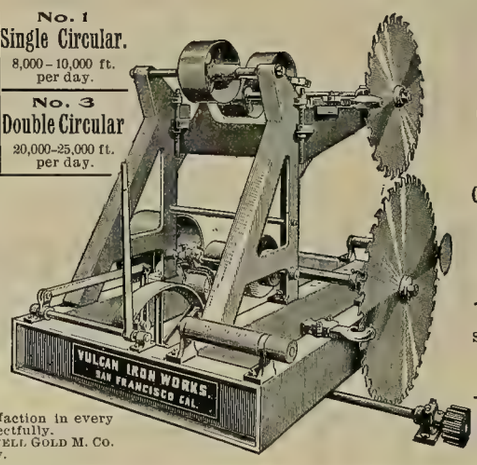
No. 0 Single Circular.	No. 1 Single Circular.
4000 - 6000 feet per day.	8,000 - 10,000 ft. per day.
No. 2 Double Circular.	**No. 3 Double Circular**
15,000-20,000 ft. per day.	20,000-25,000 ft. per day.

Alaska Treadwell Gold Mining Co.
SAN FRANCISCO.
Feb. 20, 1896.

Vulcan Iron Works,

GENTLEMEN: Our Double Circular Saw Mill of about 20,000 feet daily capacity, for which you made plans and built the machinery complete, including a set of three 6-inch beam Vulcan Head Blocks, 60-inch opening, has given us complete satisfaction in every respect. Respectfully,

ALASKA TREADWELL GOLD M. CO.
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For Mining Companies —OR— Other Consumers of Lumber at Remote Points.

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VULCAN IRON WORKS,

Office, 505 Mission Street, SAN FRANCISCO, CAL.

IF YOU HAVE A SMELTER--YOU WANT IT.
IF YOU HAVE A COPPER MINE--YOU NEED IT.
IF YOU HAVE A CYANIDE PLANT--YOU OUGHT TO HAVE IT.
IF YOU OWN CHLORINATION WORKS--YOU SHOULD BUY IT.
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What? P. & B. Paint.

IT IS ABSOLUTELY ACID PROOF---TRIED AND PROVEN.

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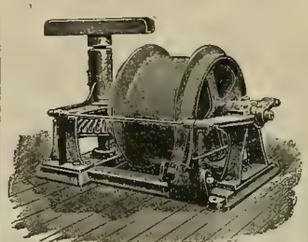
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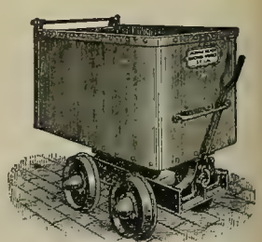
"Davis" Horse Power Whims. Ore and Rock Cars.



Specialty of PROSPECTING, MINING and MILLING PLANTS.

ORE and WATER BUCKETS.

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ADAMANTINE SHOES AND DIES

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CHROME CAST STEEL

Cams, Tappets, Bosses, Roll Shells and Crusher Plates.



STAMP SHOES.



STAMP DIES.

These castings are extensively used in all the mining States and Territories of North and South America. Guaranteed to prove better and cheaper than any others. Orders solicited subject to the above conditions. When ordering, send sketch with exact dimensions. Send for illustrated Circular.

Manufactured by CHROME STEEL WORKS, Brooklyn, N. Y.

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MANHATTAN RUBBER BELTING, PACKING AND HOSE,
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Kansas City Smelting and Refining Co.

Incorporated Under The Laws of New York.

Capital paid in.....$2,700,000.

Buyers of All Classes of

GOLD, SILVER, LEAD AND COPPER ORES,

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GOLD BARS, SILVER BARS and MILL PRODUCTS.

SMELTING WORKS:
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We use the following Cipher Codes at our Argentine Works: A. B. C. Code; Moreing & Neal's Code and Bedford McNeill's Code.



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THE FINLAYSON PATENT WIRE ROPE TRAMWAY.

THIS TRAMWAY IS THE BEST THAT HAS EVER BEEN PLACED ON THE MARKET. IT HAS NO RIVAL. IT IS STRICTLY AUTOMATIC AND ITS CAPACITY RUNS UP TO 1000 LBS. PER BUCKET. ANY ONE CONTEMPLATING THE ERECTION OF A TRAMWAY SHOULD INVESTIGATE ITS MERITS BEFORE PURCHASING ELSEWHERE. . . . . .

THE COLORADO IRON WORKS COMPANY, Denver, Colo.

SOLE AGENTS AND MANUFACTURERS.

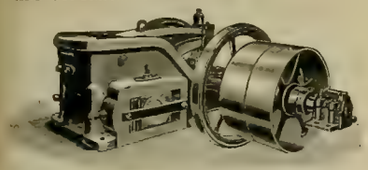
WE ARE MANUFACTURERS OF AND CONTRACTING ENGINEERS FOR

Gold, Silver, Lead, Copper and Pyritic SMELTING FURNACES.

AMALGAMATION AND CONCENTRATION PLANTS.

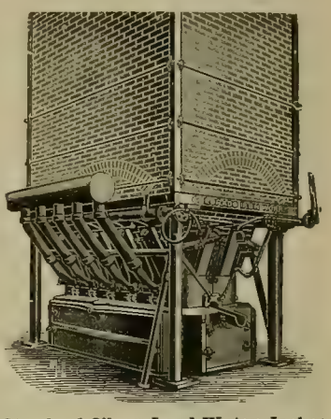
Investigate Our Late Improvements in ORE CRUSHING MACHINERY.

We Guarantee Capacity Per Day to Any Degree of Fineness.



Improved Black Hawk Ore Breaker.

OUR PATENT HOT BLAST APPARATUS for all Smelting Furnaces is a Success. A great economizer of fuel, and enlarges capacity of furnace.



Standard Silver-Lead Water Jacket Smelting Furnace.

Equipped with Arch-Bar System of Mantles, insuring rigid and strong walls. No Cracks.

The Mine and Smelter Supply Co., Denver, Colo.

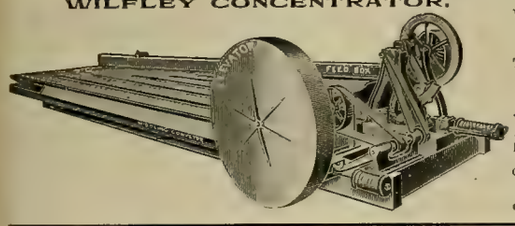
THE LARGEST STOCK OF MINING, MILLING AND SMELTING MACHINERY WEST OF CHICAGO.

PIPE, PACKING, RUBBER BELTING, AND SUPPLIES OF ALL KINDS.

SOLE AGENTS FOR WILFLEY CONCENTRATING TABLE,

And claim for it BETTER work than any Concentrator made, with a capacity of from 15 to 25 tons per day of 24 hours. It is simplicity itself. No moving belts or intricate parts. Any one can learn to operate in an hour.

WILFLEY CONCENTRATOR.



For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Colo.; Mary Murphy Mine, St. Elmo, Colo. W. E. Renshaw, Mayflower Mill, Idaho Springs, Colo.; H. E. Woods, Denver, Colo.

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THE DURANT MINING CO. THE LATE ACQUISITION CONS. MINING CO. THE COMPROMISE MINING CO. THE ASPEN SAMPLING CO. THE CONOMARA MINE. THE SMUGGLER CONCENTRATOR. THE SMUGGLER MINING CO.

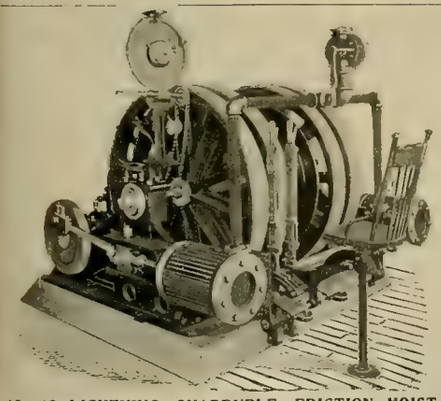
ASPEN, COLORADO, April 8, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Your favor of the 5th inst. at hand and noted. In regard to the Wilfley Table I wish to say that I consider it to be the best device in use to-day for concentrating fine ores; that it will save everything that a gold pan will; that it combines the clean saving of a Rittinger with the capacity of a buddle. I think that without question it will supplant in time all other devices for handling fine and slimy ores. This includes all the vanning machines and buddles.

This is higher praise than I am in the habit of giving, but I feel sure that it is deserved, and you may make any use of this that you desire. Yours very truly, [SIGNED] S. I. HALLETT.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

PRICE, $450.00.



10 x 12 LIGHTNING QUADRUPLE FRICTION HOIST.

The world does not require so much to be informed as reminded.—*Hannah More.*

We beg to remind you that our

LIGHTNING QUADRUPLE FRICTION HOIST

Has stood the test of years.

Workmanship and Material the Very Best.

SEND FOR DESCRIPTION AND PRICES. MENTION THIS PAPER.

HENDRIE & BOLTHOFF M'F'G CO.,

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MOTORS AND ARMATURE WINDING.
Commutators Rebuilt. Amalgam Plates.
FLINT & LOMAX, Denver, Colo.

DEWEY & CO. PATENTS
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220 MARKET ST. S.F.

Market Reports.

The Markets.

SAN FRANCISCO, May 27, 1897.

Grocery and provision houses report an increasing demand for goods, as do hardware, paints, oils, etc., but dry goods, clothing, etc., firms state that trade is dull owing to it being between seasons with them. The uncertainty regarding tariff continues an unfavorable factor in all lines of trade. In well informed circles the belief prevails that in everything that will be affected by higher tariff, there have been enough imported and on the way to meet the demand all this year without taking into consideration the fact that domestic factories are turning out and will turn out considerable goods. This condition makes dealers conservative and is causing a weakening in values in quite a number of lines.

The local money market is practically unchanged. The inquiry for funds is light in the absence of any speculative movements and no requirements, as yet, for crop moving purposes. The gold mines continue to turn out increasing quantities of the yellow metal which has its effect on the money market by causing funds to accumulate. New York exchange rules high in the absence of much of a movement of produce East and free importation of goods. New York reports a plethora of funds with the rate of interest on call loans 1½ per cent. a year. The shipments of gold are light, but it is stated they will increase later on. Speculation at the East is tame. London advices continue to note easy money markets with a good demand still ruling from Japan, Austria-Hungary and Russia for gold. This keeps the premium strong.

New York Silver Prices.

NEW YORK, May 27.—Following are the closing prices for the week:

	London.	N. Y.
Friday	27½	60
Saturday	27⅜	60¼
Monday	27⅜	60⅜
Tuesday	27 9–16	59⅞
Wednesday	27 9–16	60
Thursday	27 9–16	60

	Copper.	Lead.	Iron.	Tin.
Fri.	11 00 @11 25	3 25	10 00@12 00	13 35
Sat.	11 00 @11 25	3 27½	10 00@12 00	13 40
Mon.	11 00 @11 25	3 27½	10 00@12 00	13 50
Tue.	11 00 @11 25	3 27½	10 00@12 00	13 55
Wed.	11 00 @11 25	3 27½	10 00@12 00	13 55
Thur.	11 00 @11 25	3 27½	10 00@12 00	13 55

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	17½c Prem
New York Telegraphic Transfer	20c Prem
London Bankers' 60 days	$4.87¼
London Merchants	$4.85
London Sight Bankers	$4.88½
Refined Silver, per oz., 1000 fine	.60
Mexican Dollars	.49@50

SILVER.—The market strengthened slightly, then eased off but towards the close it was a fraction higher, but barely steady. The foreign demand is slack, which is making itself felt. Both China and the Straits take limited quantities, while Japan confines itself to gold to conform to the currency reform. The steamer that left for Hongkong the past week took out $135,000 in bullion.

MEXICAN DOLLARS.—The market is extremely dull. The last steamer for Hongkong took out only 11,800. The wants of the China trade are met mostly by exchange, which is cheaper than remitting dollars.

QUICKSILVER.—There is nothing new to report in our market. The demand is about the same as rules at this season of the year. Our market is quoted at $40.50 for domestic consumption.

COPPER.—The market is barely steady. The local demand is light. The East reports some difficulty in getting full figures; the basis of transactions from first hands is 11 cents. Stocks in this country are said to be large, but abroad they are light, with a continued free consumption, yet selling offers from this side are against an advance.

The local market is quoted as follows:

Ingot, jobbing	—@14
Ingot, wholesale	—@13
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17

TIN.—Pig is firm, but plates are irregular. The demand for both is light.

We quote as follows in a jobbing way:

Pig, per lb	14c@ —
Plate, I C coke, heavy, per box	$4 00@ 4 15
" " " light, "	3 90@ —

LEAD.—The market is quiet but steady. The East reports a fair demand.

Our market is quoted in jobbing lots as follows:

Pig	4 00 @ 4 25
Bar	— @ 4 50
Sheet	5 62½@ 6 12½
Pipe	4 87½@ 5 37½

SHOT.—There is a fair jobbing demand.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

POWDER.—Factories are kept busy to supply the demand, which is increasing from mining camps.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17½c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

BORAX—The feeling is stronger in anticipation of higher tariff.

The market is quoted as follows:

Refined, in carload lots, in barrels	5
Refined, in carload lots in sacks	4¾
Powdered, in car lots	5
Concentrated, "	4½

IRON.—There is nothing new to report either here or at the East. Last week's review covers this week's advices.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—There is nothing new to report. Increasing employment of electricity cuts into the consumption. For household purposes the demand is light.

We quote as follows:

SPOT FROM YARD—PER TON.

Wellington	$8 00@— —
Greta	6 00@ 6 50
Nanaimo	6 50@ 7 00
Cuman	5 50@ 6 00
Seattle	5 50@ 6 00
Coos Bay	—@ 4 75
Cannel	8 00@— —
Egg, hard	12 00@13 00
Wallsend	6 50@— —

TO ARRIVE—CARGO LOTS.

Australian	5 50
Liverpool Steam	6 25
Scotch Splint	
Cardiff	6 25
Lehigh Lump	9 00
Cumberland	13 00
Egg, hard	10 00
West Hartley	6 50

COKE.—The market is quoted as follows:

Gas Companies'	— — — —
English, to load	9 50 @ — —
" spot, in bulk	10 00 @ — —
" in sacks	11 00 @ 12 00
Cumberland	— — @ — —

ANTIMONY. — The market is dull and easy.

Our market is quoted at 7¼@8¼c in a jobbing way. New York mail advices quote 7½c for Cookson's, 6⅞@7⅛c for Hallett's and 6⅞@7c for Japanese.

NAILS.—The market is steady.

Wire, carloads, basis per keg	
" jobbing, " "	$2 20
Cut, carloads, " "	
" jobbing, " "	2 10

PLATINUM.—Very little doing.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC. — The market is quiet at steady prices.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is dull.

We quote in jobbing lots at 50 cents per pound for ingots.

Chemicals.

Our market is practically unchanged. The slow progress made in tariff legislation has an unfavorable effect, but now that the bill is before the Senate speedy action is looked for. Stocks in this country are large, imported in anticipation of higher duties.

SPELTER.—The market is quiet at unchanged quotations.

We quote our market in a jobbing way at 5 cents a pound.

BISMUTH.—The demand is light.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is easy.

We quote in a jobbing way at 70 to 75 cents per pound.

BONEASH.—There is a good shipping demand.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is steady at 3c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a slow demand at 2½c a pound from stores.

NITRATE OF SODA.—The movement is light.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

SULPHURIC ACID.—The demand is light.

We quote in a jobbing way at 1½c per lb for 66%.

NITRIC ACID.—Our market is reported steady from store at 6½@7c per pound in carboys.

BLUE VITRIOL. — Our market is fairly steady.

We quote in a jobbing way at 4½c per pound.

Mining Share Market.

SAN FRANCISCO, May 27, 1897.

The market fluctuated downwards from Thursday, May 19th, to yesterday, when a slightly steadier tone was noticeable in Chollar. Throughout the week attention has been attracted to the work in Chollar on the Brunswick lode, where it is claimed an important strike has been made on the 500-foot level. It is stated that the find is entirely new and has no connection with the ore found on the upper levels. While not saying it, yet if this is the case then it must be the apex of another vein which ought to be struck on the 600-foot level. Outside of this little find, the work on the 500-foot level has not resulted so far as favorable as had been expected by the many. The strength in Chollar brought in some strong outside buyers, who took the shares at around 85 cents. They bought on bull points from the mine. Potosi sympathized with Chollar. With the better informed class of operators there is a bear feeling, but so far as can be learned they do not risk much on the bear side except on spurts. These persons have been correct for a long time past. They think that while the market may go some higher, the developments in the mines and general condition of business and finance on this coast and at the East, do not warrant a bull movement. It looks now that after the Chollar and Potosi flurry has subsided, attention will center on the work either in Confidence-Challenge-Con. Imperial west crossdrift or else in that of Yellow Jacket-Kentuck and Crown Point. Late advices state that work in both is being pushed steadily ahead. From the first-named joint west crossdrift official and semi-official advices state that it is quite possible the west or red lode straightened, and if so they will have to run some distance yet. Had they read an article in the MINING AND SCIENTIFIC PRESS, published in 1895, on the west lode they would have seen that it dips slightly to the west, whereas the old Comstock lode dips to the east. They either do not know their business or else they are trying to mystify the public for some kind of object not as yet apparent.

From the Comstock mines there is nothing allowed to leak which is calculated to excite the credulity of outside operators. This is done, as stated by one of the philanthropic insiders, so as not to cause operators to rush in and load up with shares of mines in which developments do not warrant prices paid. In Utah work is continued on the east crossdrift started from the north drift. No change is reported. Work is continued in the west crossdrift from the Layton tunnel level in Sierra Nevada. At last advices it was in hard porphyry. In Union active work is continued on the 900-foot level. A west crossdrift has been started at a point 900 feet north from east crossdrift No. 3. In Mexican they are still working to the west on the 1000-foot level. In Ophir they have started another west crossdrift on the 1000-foot level. This time it is from the main north drift, 125 feet from the shaft station. The work in this mine continues to be confined to the 1000-foot and Central tunnel levels. No change is reported in material encountered. In Andes they are running a north drift from the east crossdrift on the 175-foot level. In Con. Virginia active preparatory and also exploiting work is continued on the 1000-foot, 1650-foot and 1750-foot levels. There is nothing new to report in any of the work. There were extracted and sent to mill the past week 71 tons of ore, assaying over $62 to the ton. This does not pay expenses. Unless more ore is taken out an assessment will have to be levied before long. Best & Belcher and Gould & Curry work is still jointly to the east from the Bonner shaft. In Savage they are exploiting on the 500-foot and 750-foot levels. Nothing of interest is reported. There is nothing new from Hale & Norcross, and nothing expected while lawsuits are the order. Work reported is confined to the 900-foot level. Repairing in Potosi took up some time, but work has been resumed again. The delays eat up money and bring out assessments. No change is reported in the work in Bullion, Alpha or Con. Imperial, Confidence or Crown Point. They are still raising ore in Belcher, but from what level or levels the letters are still silent. There is nothing new reported from Overman, Caledonia or Alta. The former raises a few tons of ore each week.

The center of attraction on the Brunswick lode continues to be Chollar, as noted in the fore part of our review. In this mine, on the 500-foot level, they struck a small seam of ore which was followed until the shorts filled and some bulls bought, when the ore got away from them to the east. It may be found, if there are enough shorts to justify it. Ore continues to be extracted, raised and sent to the mill from the 400-foot, 300-foot and 200-foot levels. Last week 256 tons were raised, assaying $19.12 gold and 18.12 ounces silver. In Occidental there is active exploiting and preparatory work on the 550-foot level. No change is reported in the joint work of Gould & Curry, Best & Belcher and Con. Virginia. In Savage they have resumed work in sinking the shaft.

The following illustrates the changes of the week:

MINES.	May 20.	May 27.
Alpha		
Alta Consolidated		$ 02
Andes	$ 18	20
Belcher		
Best & Belcher	61	65
Bodie		
Bullion		03
Challenge		24
Chollar	99	1 15
Confidence	1 00	
Consolidated California and Virginia	1 75	1 80
Consolidated New York		
Crown Point	32	21
Exchequer		
Gould & Curry	20	18
Hale & Norcross	91	
Justice		
Mexican	37	36
Ophir	91	90
Overman		
Potosi	60	64
Savage	30	34
Sierra Nevada	42	38
Union	30	34
Utah		
Yellow Jacket	30	

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied.	Delinq't and Sale.	Secretary.
Alta S M Co, Nev	56	5c	May 21	June 25. July 16	J E Jacobus, 309 Montgomery
Bullion M Co, Nev	50	10c	May 4	June 8. June 28	R R Grayson, 331 Pine
Challenge Con M Co, Nev	23	10c	May 13	June 16. July 8	C L McCoy, Mills Bldg
Chollar M Co, Nevada	43	15c	May 10	June 15. July 8	C E Elliott, 309 Montgomery
Eureka Con D M Co, Cal	8	5c	Apr 2	May 15. June 5	D M Kent, 330 Pine
Gould & Curry S M Co, Nev.	81	20c	Apr 29	June 1. June 22	Alfred K Durbrow, 309 Montgomery
Gray Eagle M Co, Cal	46	5c	Mar 30	May 8. May 29	W J Gurnett, 308 Pine
Jamison M Co, Cal	9	5c	Nov 27	June 23. Aug 18	Sam W Cheyney, 120 Sutter
Marguerite G M & M Co, Cal.	6	10c	Apr 12	May 24. June 21	F Mettmann, 237 Twelfth
Occidental Con M Co, Nev	27	10c	May 11	June 12. July 1	Alfred K Durbrow, 309 Montgomery
Overman S M Co, Nev	77	10c	Apr 12	May 17. June 7	Geo D Edwards, 414 California
Pine Hill G & S M Co, Cal	10	5c	May 10	July 1. July 22	Chas A Hare, 1003 Railroad Ave
Rock Island G & S M Co, Nev.	14	2c	May 20	June 25. July 6	W W Guptill, 309 Montgomery
Savage M Co, Nev	92	20c	Apr 13	May 17. June 7	E B Holmes, 309 Montgomery
Seg Belcher & Mides Con M Co, Nev	19	5c	Apr 6	May 10. May 29	E B Holmes, 309 Montgomery
Sulphur Bank Q M Co, Cal	5	25c	Mar 23	May 3. June 3	T Wintringham, 306 California
Thorpe M Co, Cal	6	2½c	Apr 14	June 7. June 27	A F Frey, Phelan Building
Union Con S M Co, Nev	54	20c	Apr 7	May 11. June 1	A P Swain, 309 Montgomery

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San Francisco Stock Board Sales.

SAN FRANCISCO, May 27, 1897.

9:30 A. M. SESSION.

200 Alta		02	200 Gould & Curry		18
200 Andes		20	600 Ophir		89
100 Bullion		03	100 Potosi		03
400 Challar		1 10	100 Sierra Nevada		38
100 Con Cal & Va		1 75	100 Union		34

SECOND SESSION—2:30 P. M.

100 Ophir		90	100 Crown Point		21
400 Mexican		36	300 Sierra Nevada		41
50 Best & Belcher		65	300 Bullion		03
500 Con Cal & Va		1 80	300 Caledonia		09
50 Savage		34	100 Challenge		24
600 Challar		1 15	200 Occidental		14
100 Potosi		64	100 Standard		1 50

Rainfall and Temperature.

The following data for the week ending 5 A. M., May 26, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week	Total Seasonal Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date	Total Seasonal Rainfall to Date.	Average Seasonal Rainfall to Date.	Minimum Temperature for the Week.	Maximum Temperature for the Week.
Eureka	.04	49 50	51.42	44 85		44	64
Red Bluff	.04	24.16	22 13	25.47		54	98
Sacramento	T	17.28	23 22	26.60		52	93
San Francisco	.00	23.22	21.20	23.75		50	88
Fresno	.00	10.53	8 18	7 33		54	100
San Luis Obispo	T	20.74	17.72	....		46	80
Los Angeles	.00	16 85	9.35	19.68		50	76
San Diego	.08	11.77	5.92	10.43		58	84
Yuma	.00	5 35.	0.88	2.98		64	98

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THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Hoey & Lewis, in the Parsons Gravel and Timber Claim in Brownsville Mining District, El Dorado Co., to deposit tailings in Little South Fork of Cosumnes River; from Daniel McLaughlin in the Morristown Mine at Morristown, Sierra Co., to deposit tailings in the Morristown Ravine; from Henry Northrop and Robert C. Nicholson, in the Etta Placer Mine near Sierra City, Sierra Co., to deposit tailings in North Fork of Yuba River; and from J. P. West, in the Mountain View Mine near Coutolenc, Butte Co., to deposit tailings in Little Butte Creek, gives notice that a meeting will be held at room 59, Flood Building, San Francisco, Cal., on June 14, 1897, at 1:30 P. M.

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Assessment Notices.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9), of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 31st day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 26th day of March, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on SATURDAY, the 24th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 19th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of April, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on MONDAY, the 24th day of May, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 19th day of July, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of May, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on WEDNESDAY, the 23rd day of June, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 18th day of August, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 14th day of April, 1897, an assessment (No. 6) of .02½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 44 Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 22d day of May, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 14th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

POSTPONEMENT.

The date of delinquency of the above assessment has been postponed to June 7th, 1897, and the day of sale to SATURDAY, June 27th, 1897, by order of the Board of Directors. A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

GOULD & CURRY SILVER MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, Virginia, Storey County, Nevada.

Notice is hereby given, that at a meeting of the Board of Directors, held on the 29th day of April, 1897, an assessment (No. 81) of 20 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the secretary, at the office of the company, room 69, Nevada Block, 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 1st day of June, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on TUESDAY, the 22d day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room 69, Nevada Block, No. 309 Montgomery street, San Francisco, California.

CHALLENGE CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Gold Hill, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the 13th day of May, 1897, an assessment (No. 23) of Ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, room 35, third floor, Mills building, corner Bush and Montgomery streets, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 16th day of June, 1897, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 8th day of July, 1897, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

C. L. McCOY, Secretary.

Office—Room 35, third floor, Mills building, San Francisco, California.

OCCIDENTAL CONSOLIDATED MINING COMPANY. Location of principal place of business, San Francisco, California. Location of works, Silver Star Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 11th day of May, 1897, an assessment (No. 27) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of June, 1897, will be delinquent, and advertised for sale at public auction, and, unless payment is made before, will be sold on THURSDAY, the 1st day of July, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

In the Superior Court of the City and County of San Francisco, State of California, Department No 8. John V. Kimball, plaintiff, vs. Mabel L. Kimball, defendant. Action brought in the Superior Court, City and County of San Francisco, State of California, and the complaint filed in said City and County of San Francisco, in the office of the clerk of said Superior Court. The people of the State of California send greeting to Mabel L. Kimball, defendant. You are hereby required to appear in an action brought against you by the above-named plaintiff in the Superior Court, City and County of San Francisco, State of California, and to answer the complaint filed therein within ten days (exclusive of the day of service) after the service on you of this summons, if served within this county; or, if served elsewhere, within thirty days. The said action is brought to dissolve the bands of matrimony now existing between yourself and plaintiff, on the ground of habitual intemperance on your part for more than one year past. All of which will more fully appear in the complaint on file herein to which you are hereby referred. And you are hereby notified that if you fail to appear and answer the said complaint, as above required, the said plaintiff will apply to the said Court for the relief prayed for in the complaint. Given under my hand and seal of said Superior Court at the City and County of San Francisco, State of California, this 9th day of April, in the year of our Lord, one thousand eight hundred and ninety-seven. C. F. Curry, Clerk. By Joseph Riordan, Deputy Clerk.



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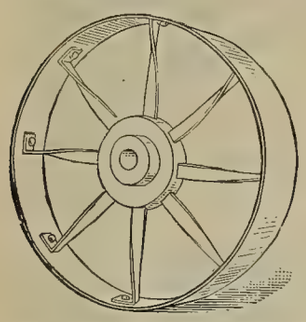
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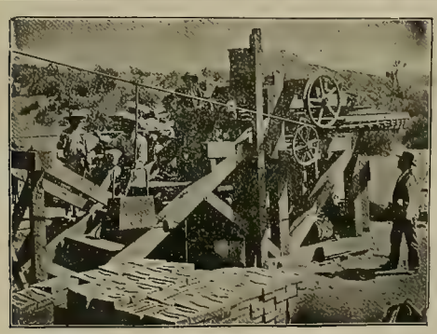
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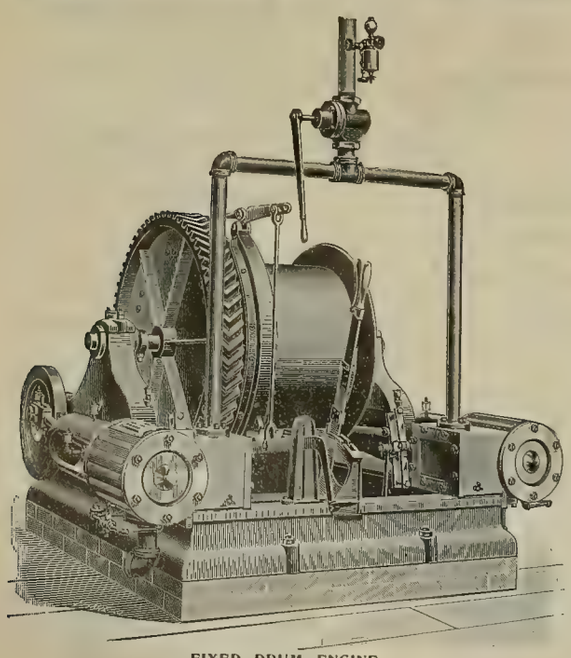
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MINING AND SCIENTIFIC PRESS.
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California Asphaltum Products.

The fact that the owners of the asphaltum deposits of this State within easy reach of sea transportation are devoting their attention now much more to Eastern and foreign markets than to the local demand is a matter of considerable consequence to that industry. Widespread as is the use of asphaltum for paving and other purposes the world over, it was not until 1854 that it was first tried. That was in the city of Paris. In very few large cities of this country or of Europe is more than a small proportion of the streets paved with asphalt. A notable exception is Washington. No other article has been found that will satisfy nearly so well the principal requisites. It is elastic, smooth and less noise is made upon it by traffic.

The article as used on the streets here is an asphaltic sandstone, while that which comes from the island of Trinidad is an asphaltic limestone. Asphaltum is a mineral pitch, more or less pure, which may be mixed with sand or other material for street paving. It is for this reason that the people at Santa Barbara who obtain, at but a trifling cost for purifying, asphaltum over 90 per cent pure, are enabled to ship it East, where it is mixed with four parts sand to one of asphaltum for street paving.

Heretofore the output has been controlled by the local demand, which has not been large enough to maintain prices. Of asphaltum the output, according to the returns of the Mining Bureau, was, in 1894, 11,698 tons, valued at $238,800; in 1895, 25,525 tons, valued at $170,500, and in 1896, 20,914 tons, valued at $362,590. Of asphaltic sandstone or bituminous rock the returns were for 1894, 31,214 tons, $115,193; 1895, 38,921 tons, $121,586, and 1896, 49,456 tons, $122,500. The total value of the output of asphaltum and bituminous rock in 1896 was therefore valued at $485,090.

For some four years now shipments have been made to the East from about Santa Barbara, and the amount is increasing each year. Some of it is being tried on the streets of Paris to compare with the European article, which is an asphaltic limestone which becomes harder and slippery. So, too, the city of Glasgow, Scotland, probably the best governed city in the world, has lately obtained a supply for the purpose of comparing it with products from other sources.

In New York a great deal of money is being expended on asphalt, and there is hardly a city in the United States which will not within the next few years repave a large proportion of its streets with asphalt, for no other satisfactory material can give the two requisites—smoothness and noiselessness as well. The bicycle is compelling the use of smooth pavement more than ever before.

From Santa Barbara a rate of $4 per ton on asphaltum to the East has been obtained. This article, 90 per cent pure, to be mixed with four parts of sand at the place of consumption, has a great advantage over the Trinidad article, which is only 33 per cent pure as imported.

The Trinidad article, which is the only product against which California will have to compete, is claimed to be in many respects inferior to ours. For instance, in mixing the Trinidad article they use petroleum residues having a paraffine base, out of which the naphtha and lighter oils have not all been taken. As simply a mixture is made, these in time evaporate and the paving cracks. With the California asphalt they are mixed with a flux which is a solvent. California oils have an asphalt base. Then the Trinidad article is not so satisfactory around hydraulic works.

In time considerable use will be found for the California asphaltum for lining ditches and reservoirs. In ditches the percolation would be entirely stopped and the friction greatly decreased. As a lining for reservoirs it has one great advantage over Portland cement in that it will not crack with trifling subsidences of the earth. A reservoir of a capacity of 1,500,000 gallons of water, being constructed for the city of Santa Barbara, is lined with asphaltum.

The principal deposits worked of late in California have been in Kern county, at Asphalto, and in Santa Barbara county. Yet good qualities of asphalt, found in large quantities, have been worked in other counties.

The imports of asphaltum into the United States in 1895 was about 80,000 tons, most of which came from the asphalt lake in the island of Trinidad and about 3400 tons from the State of Bermudez, in Venezuela. Besides what was mined in California, there was very little asphalt produced in the United States. Glance pitch, or gilsonite, of Utah controls the black varnish market. The asphaltic rock for paving of Utah, owing to cost of transportation, will not probably compete with the California product for some years to come, and then only in the interior of the country, away from seaboard. Besides these sources, there are deposits in the Indian Territory upon which considerable money has been expended without success. Then there are deposits in Kentucky which have not proved of great value.



BITUMINOUS ROCK QUARRY OF THE CITY STREET IMPROVEMENT COMPANY.

The great value of the asphalt deposits of California lies in the fact that there can be no competition in this country except from foreign articles, and against these there seem to be advantages that promise local control of the field. The demand for asphalt all over this country is growing, and the consumption should within a few years increase many fold. Many other materials have been given trial for smooth pavements, but none have stood the test so well as asphalt, which promises to hold favor for many years to come.

Chinese Gold Mines.

The prospectus of a large company being brought out in London to develop by itself and sub-companies mineral resources in north China—eastern Mongolia—states that a concession has been obtained extending over 30,000 square miles of territory owned by Prince T'san. It is stated that for centuries past the Chinese have been engaged in washing gold from the gravel along the rivers having their rise in north China, and at present 100,000 natives find employment in this industry. With the building of the great Siberian railway, with its branches into north China, a rich field promises to be opened.

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TO THE PUBLIC.

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San Francisco, June 5, 1897.

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Statisticians and the Gold Yield.

Statistics are very satisfactory when only one statistician works on any particular line, but when two or more go at it the faith of the public in the value of statistics is apt to be weakened. *Mineral Industries* came out the other day with a statement that the product of gold in the United States in 1896 amounted to no less than $58,660,637. In January, a few days after the close of last year, John J. Valentine, President of Wells, Fargo & Co., gave as an estimate of the value of the gold yield $53,015,242. Last Tuesday, some six months later, Mr. Preston, the Director of the Mint of the United States, announced that the gold yield amounted to $53,600,000.

One thing that is particularly worthy of note about Mr. Preston's figures, is that he credits California with an output of 721,600 ounces, or about $14,500,000, a slight decrease from the figures of 1895. Yet about a month ago Mr. Yale, the statistician of the United States Mint at San Francisco, from the best available returns announced that the gold yield of California in 1896 was $17,181,562, an *increase* over that of 1895 of $1,847,245.

Mr. Preston's figures make the gold product of the United States for 1896 greater than that of the previous year by about $6,250,000, while the *Mineral Industries* makes out an increase of about $11,000,000.

Comparing the United States Mint statistics with those of Wells, Fargo & Co. for Oregon for a number of years back, it will be seen that they were for 1891—Mint, $1,994,622; Wells, Fargo & Co., $1,004,000. 1892—Mint, $1,491,781; Wells, Fargo & Co., $1,020,886. 1893—Mint, $1,645,300; Wells, Fargo & Co., $1,151,977. 1894—Mint, $2,113,356; Wells, Fargo & Co., $1,603,218.

The great differences between all these figures do not show that any of the people quoted have been careless or were unskilled in their work. The great trouble in gathering statistics, especially in the West, is the lack of sources of intelligent information. The mine owners are not compelled by law to make returns of products, and a very large proportion refuse to do so. Returns are now being required by law in Utah and Nevada under laws levying a tax on the yield of mines. Yet this in itself may tend to make some conceal the true facts.

However uncertain all the statistics are, and however much the statisticians differ, one fact is brought out clearly, and that is that mining is the most prosperous industry in the country.

The Future of Copper Mining.

The production of copper last year was considerably larger than ever before and there has been a continued increase during the first months of 1897. At the same time the stock in Europe has been steadily decreasing and is now about half of what it was a year or more ago—or about a month's supply. This has not been due to any decrease in the amount shipped to Great Britain and the Continent, but to the rapidly increasing demand for it. In the meantime the supply from Chili and other foreign countries does not promise to increase. An official in one of the large copper mining companies is quoted by the Boston *Financial News* as saying:

If business in this country should start up I do not know what Europe would do for copper. The European supply of copper has been decreasing constantly for over a year notwithstanding the large exports of the metal from this country, showing an enormous consumption of copper over there. Domestic consumption of copper is about 50 per cent of the normal amount, and this has been the case since the panic in 1893. It seems ridiculous that this large country cannot absorb one-half of the copper produced here, while Europe is using more than half our product and large amounts imported from Chili besides. I suppose the condition of things will change some time, but it seems a long wait.

It is hardly possible that the increase in the output of copper will in the near future keep pace with the increased demand; yet the price of copper has not risen very much, although it is considerably higher now than it was a year ago. It seems probably that influences are brought to bear to keep the prices down by those manipulating the copper markets of the world. In the meantime there is more eagerness than ever shown on the part of European and Eastern investors to obtain control of copper properties that are already opened or of those that promise well.

A considerable rise in the price of copper will of course cause the opening up of many properties which now cannot be worked at a profit. There will no doubt be found new fields for copper mining, and a number of those now being exploited will soon be made to produce. In Arizona there is more activity in new mines than ever before; the Seven Devils District of Idaho is being taken hold of by capitalists; mines in Northwestern Montana are being exploited, and there is considerable activity in different parts of Nevada. Yet it is hardly to be expected that from all these sources will the output be increased in the near future as fast as the demand.

Outside of the Michigan mines there are no copper properties of consequence being worked that do not produce precious metals as well as copper; and without these precious metals, at present prices, few, if any, of them would pay. The question of transportation is of course of much importance in copper mining, and the opening up of mines that are now known to be valuable, but unworked, will depend largely upon the building of railroads.

A Warning to Locators Under the New Law.

The new California law as to locations went into effect last week, and will govern all locations hereafter made. As it provides that "all locations * * hereafter made which do not conform to the requirements of this act * * * shall be void," it is incumbent on locators to use special care to conform strictly with the law as it now stands. It should be clearly borne in mind that the new law does not in any manner supersede the existing Federal law, but is merely supplementary thereto, and all the provisions of the United States law are just as binding as ever. Sec. 2324 of the United States Revised Statutes reads in part as follows:

SEC. 2324. The miners of each mining district may make regulations not in conflict with the laws of the United States, or with the laws of the State or Territory in which the district is situated, governing the location, manner of recording, amount of work necessary to hold possession of a mining claim, subject to the following requirements: The location must be distinctly marked on the ground, so that its boundaries can be readily traced. *All records* of mining claims hereafter made *shall contain* the name or names of the locators, the date of the location *and such a description of the claim or claims located by reference to some natural object or permanent monument as will identify the claim.*

Section 2 of the new mining law in prescribing the contents of the preliminary notices, which must be recorded, omits the provisions of the Federal law above quoted in italics. It would appear that whenever this point is raised in contest in either the departments or the United States courts it will be held that notices filed for record and which do not contain these points are not such notices as the Federal law requires, and are invalid.

Eastern Mining Investors.

It is particularly noticeable of the average Boston investor in mining property that he looks only for those that are developed and paying profits. He goes into the business just as he would make investments in railroad stocks or government bonds for the dividends or interest returns. Prospects or partially developed properties, no matter how well they promise nor how cheaply they may be purchased, have little attraction for him. The Californian prefers to take such properties and develop them. Of all the money that has been put into mines by local people but a trifling percentage has gone into paying mines. The Californian is a good miner and directly does more than anyone else to develop the industry.

But after all the Boston or other Eastern people who only want good-paying properties indirectly do much good, and such inclination should be encouraged. Of late there has been an unusual amount of inquiry from conservative business men not only of Boston but other Eastern centers for opportunities for safe investments in mines. This shows the great change of sentiment that has come about in a few years in regard to that industry. On this subject the conservative Boston *Post* in an editorial lately says:

There was a time, not so far distant either, when mining, whether of gold, silver, copper or iron, was hardly considered a legitimate field of investment, and when mining men, particularly the promoters of large enterprises, were in the eyes of investors too often classified with the green-goods men and the gold-brick manufacturer. * * * Now, however, that there have been so many failures in the industrials the investor is compelled perforce to seek some new field for the legitimate employment of his capital.

But where can he find such a field in these days of low interest bearing bonds? In the past twenty-five years there has been no class of securities in which New England capital has been placed which furnished safer and sounder investments and have returned a larger and more continuous rate of interest on the capital invested than mining stocks, particularly the shares of the great Lake Superior and Montana copper mines. Through the experience of the recent years of depression, when the passing and cessation of dividends have become so common, the investor has at last awoke to this fact and discovered that there is such a thing as legitimate mining, and that legitimate mining offers to-day most exceptional attractions to capital.

There is no doubt that the coming summer will see a great interest taken, not alone in mining speculation, but in legitimate mining—a branch of industry which has gradually come to be regarded as among the safest investments the country has got now. Some of the best banking houses in the East, particularly here and in New York, are all the time on the lookout for good gold or copper properties, and some of the best people are going into them. A general revival of the mining industry will mean more for Boston than any other Eastern financial center.

A Duty on Onyx.

The United States Senate last Tuesday agreed to an advance in the duty on onyx from 50 cents to $1.50 per cubic foot. As pointed out in the MINING AND SCIENTIFIC PRESS a few weeks ago, all that is necessary to enable the owners of the California onyx deposits to work them is some such duty as is proposed, and it is to be hoped that it will finally pass. Without it there can be no market for the American onyx deposits in this country, for it would be impossible to compete with the cheap labor of Mexico, where most of the onyx that comes to the Eastern States is quarried. The proposed duty would enable the California and other Pacific coast producers to compete in the Eastern States with the article now brought in from the southern republic. Were there any question as to the quality of the onyx found in California a good argument might lie against this duty, but there is not. It was generally acknowledged that the finest onyx displayed at the World's Fair in Chicago was from this State.

Concentrates.

ON the Congress mine in Arizona it is proposed to sink to the 3,000-foot level.

THE London *Statist* states that the interest there in American mining is increasing.

THE owners of the Crystal mine at Marysvale, Utah, propose to erect a mill shortly.

A GOLD ledge has been discovered near Elko, Nev., and many claims have been located.

THE Calumet & Hecla shipped 9,375,812 pounds of copper between January 1st and May 15th.

IN the Olympics in Washington a ledge of onyx, said to be of good quality, has been discovered.

AT the Gwin mine in Calaveras county sixty stamps are to be added to the mill, making 100 in all.

EDWARD SMITH will erect a 5-stamp mill on his mine on the Rogue river, near Grant's Pass, Oregon.

THERE are over 300,000,000 gallons of water in the new reservoirs at the Gold Creek mines in Nevada.

THERE are 150 freight teams on the road hauling freight from Elko to the Gold Creek mines in Nevada.

THE Noble mine, on Wisconsin creek, Montana, has been bonded to Reins and others of Butte for $100,000.

FOSTER and Fore propose to erect a 10-stamp mill on the American mine near Fort Jones, Siskiyou Co., Cal.

TWO sluice robbers were shot last week in Siskiyou county, Cal., on the Gilmore & Baur mine, near the Oregon line.

ALONG the trail into the Yukon country is strewn a large amount of supplies found to be useless or too weighty to carry on.

THE Anglo-Mexican reports the total output for the month of April $32,610 bullion, $1050 concentrates; 1671 tons; 26 days' run.

AN antimony mine at Kingston, Idaho, which has been idle for some years, is to be reopened, and a smelter is being built.

A STRIKE in the Argentum-Juniata at Aspen, Colorado, last week, caused the stock to advance from 11 to 55 cents per share.

ROBBERS broke open the safe at the Providence mine at Nevada City, Cal., last Tuesday night, and stole $2,500 worth of amalgam.

THE company owning the Niagara mine in Shasta county, Cal., has been reorganized, and a large amount of exploration is to be done.

A NUMBER of new companies are being formed in London to work British Columbia mines, more probably than for any other district.

NEAR Tacoma, Wash., on Lynch and Mashell creeks, copper and gold prospects have attracted the attention of a number of prospectors.

SINCE the closing of the Rossland, B. C., mining stock exchange it has been proposed to start another as a branch of the Board of Trade.

WITHIN the past ten days the price of best copper in London has been rising, and sales are now being made of late at 11¼ cents per pound.

A MOVEMENT is on foot in Butte, Montana, to start a mining stock exchange. One was organized a few years ago, but it met with little success.

THE management of the Gold Dust mine at Mercur, Utah, have decided to begin the construction of a mill with a capacity of 100 tons daily.

AT the Mercur mine, in Utah, the new machinery has been put in place and the output increased to 300 tons a day. It has paid in dividends $675,000.

AT Colorado Springs the cook at the Antlers hotel is taking rich gravel out of a shaft in his back yard, and some of his neighbors are also sinking.

A CABLE from London announces that the Government is preparing to transport 30,000 troops to South Africa, besides 8000 horses and 25,000 mules.

AT New Denver, B. C., properties are being staked at the rate of forty or fifty a day, and miners' licenses are issued at the rate of 150 and 200 a week.

THE London Gold Tunnel Company propose to penetrate Mule Mountain in Shasta county, Cal., with a tunnel which will give a depth of over 2000 feet.

THE old mining town of Aurora, Nev., now has so few inhabitants that the postoffice there has been closed. Mail for Aurora will go to Fletchers, Esmeralda county.

THE prospective increase in the duty on lead ore by the Dingley bill has caused an American company to decide to establish a smelting plant at Monelova, Mexico.

THE Prescott Placer Dredging Company has been organized at Tacoma, Wash., to use the Bowers dredger in the streams on this coast in which there is gold in the sands and gravels.

A MINING CONVENTION is to be held at Rat Portage, Ontario, Canada, June 23 and 24. An exhibit of ores has been prepared from every portion of the gold fields of northwestern Ontario.

H. BRATNOBER and John B. Farrish have been making an examination of the Butterfly and Terrible mines, near Telluride, Colorado, on behalf of the Exploration Company of London.

VICTOR AUSTIN has bonded to New York people his quartz mine in Willow Valley district, Nevada county, Cal., for $10,000. It is proposed to sink an additional 500 feet, making 900 in all.

THE conference report upon the sundry civil bill, which suspends the reservation of forests under President Cleveland's order of February 22 last until March 4, 1898, has passed the Senate.

THE importance of a small difference in cost to the working of mines is shown by the closing of big properties in Utah on account of the raise in transportation and smelter rates and price of powder.

THE town of Ymir, on Salmon river, B. C., three months ago consisted of a water tank, hotel and store, but through the discovery of mines in the neighborhood has since increased its population to 600.

A PATENT has been obtained for the Bates mine in Gilpin county, Colorado, and this settles a mining suit of 30 years' standing which has gone the rounds of the courts since application was made.

As a result of the decision of the United States Supreme Court in the Colorado tunnel case, it is stated that a number of tunnel enterprises which had ceased operations will resume work at Cripple Creek.

STOCK in the Mollie Gibson mine of Aspen, Col., which once sold as high as $12 and a few weeks ago was down to 12 cents, last week went up to 56 cents upon the report of the discovery of rich ore in the mine.

THE Boundary Creek district in British Columbia will soon be tapped by a branch of the Corbin system or railways, and there is a race between Corbin and Heinze to get into the Kettle Creek district first.

THE American Loan and Trust Company of New York have floated bonds for the construction of a smelter in the Seven Devils copper district in Idaho. The machinery for its construction is already on the way.

L. S. ROSE and others, who under the name of La Suerte Mining Company held the bond on W. W. Kirkham's quartz claim near Nevada City, Cal., have made their final payment of $12,500 and taken their mine.

MINING companies in British Columbia are alarmed at the announcement that the Ontario legislature has passed an act that mine shares cannot be sold in Ontario without a license, for which a large fee is charged.

SINCE the new law as to mining locations went into effect in Utah, there has been a great falling off in the number of notices filed. Last week in the Tintic district not one was offered at the district recorder's office.

THE first sale of consequence in the new Stateline district on the boundary between Utah and Nevada took place last week, Knight Brothers & Company purchasing a two-thirds interest in the Creole mines for $24,000.

A DISCOVERY of oil has been made by the Southern California Railroad Company near its line at Richfield, San Bernardino county, Cal. Seventy-five barrels are being obtained daily and six drills are to be put at work.

IT is reported that the Whitewater mine in the Slocan district, B. C., has been purchased by the Puget Sound Reduction Company of Everett for $500,000. The Whitewater has been a regular dividend payer for the past two years.

DURING January, February and March of 1897 the total influx into the colony of West Australia was 20,838, compared with 14,862 in the first three months of 1896. The departures for the same periods were respectively 6164 and 9154.

IT IS announced in British Columbia that the Cassiar railway concession has been acquired on behalf of the Transvaal Gold Fields (Limited) of London. This includes the right to 70 lots of 10,000 acres of land with all minerals contained.

THE gold value of New South Wales, Australia, for the quarter ending March 31st, was 63,633 ounces, a decrease of 10,000 over last year. The Queensland returns are 167,488 ounces against 147,664 for the corresponding period of 1896.

THE Alaska-Mexican Mining Company of Alaska reports the clean-up for April, 1897, to be: Bullion shipment, $33,153; ore milled, 13,206 tons; sulphurets treated, 437 tons; of bullion there came from sulphurets, $14, 666; gross expenses for period, $22,638.

A LAW of Utah requires the owners of mines before June 10 of each year to make sworn statements of the product of their mines upon which a tax is collected. There has been renewed opposition to the law enacted lately, and it is proposed to make a fight against it.

THE Miners' Association was reorganized at Quincy, Plumas county, last week, to succeed the old association, and the following officers elected: President, Sam W. Cheyney; vice-president, M. S. Light; secretary, William Watson; treasurer, B. C. Lorich.

THERE was a rush to file locations of mining claims before the new law went into effect in nearly every mining district in the State in order to take advantage of the easier provision of the old law. On Monday, May 24th, at San Bernardino, there were fourteen locations filed.

THE Mammoth mill has followed the Bullion-Beck at Tintic, Utah, in closing down, owing to the increased transportation and smelter charges and rise in price of powder. It is expected that others will follow soon, and it is even claimed that work on the Sioux Ajax tunnel will be stopped.

THE California Debris Commission has received new applications for permits to mine by the hydraulic process from Hoey & Lewis for the Parson claim, El Dorado county; from the Morristown mine, Sierra county; the Etta placer mine, Sierra City, and the Mountain View mine, near Coutolenc.

THIS has turned out a poor season for water for the hydraulic miners on the Pacific coast. Never before for many years had so much money been spent upon equipping plants for working, and while the season was short the great number of new mines and the improved methods of working have doubtless increased the output.

THE enormous profit of the sale of dynamite in the Transvaal, S. A., has attracted attention to the facilities afforded by California in that regard. The local powder companies are considering the invasion of that profitable field. It is thought that an energetic business policy could secure the sale in that and other mining fields of 500 tons per month.

AT Cripple Creek, Col., the production of ore has been so great of late that the mills cannot handle it and the railroads have given notice to mine operators that they must restrict their shipments. This refers mainly to the lower grades. There are some additions being made to the milling capacity of the district, but it is claimed that the opening of new mines is more than keeping pace with this.

THE Elkton Consolidated Company of Cripple Creek, in its annual report to April 30, shows the following figures: Gross production, $609,711.31; returns on ore, $520,890.25; net profits, $346,867.53. The mine and office expenses amounted to 28 per cent of the gross production. The total dividends paid by the company amount to $266,960.57. The cash reserve amounts to $208,316.50 in the bank and in United States bonds.

IT is claimed that the addition to the tonnage of Leadville involved in the unwatering of the down town district will be about 1000 tons per day. The present shipment from the Leadville mines is about 1200 tons daily, so that when the drowned district is entirely unwatered the daily product of Leadville should be at least 2200 tons. When the strike was started last year the shipments were about 1800 tons daily.

THE Witwatersrand, South African, Chamber of Mines, in an analysis of the gold production of 36 leading mines, in March, shows that the mills, with 2440 stamps, crushed 312,673 tons, in 28¼ days, or an average of 4.49 tons per stamp per day of 24 hours. The yield of gold on the plates was 116,240 ounces, or £1 6s 10d per ton. From the concentrates and tailings there was obtained 68,888 ounces, making a total value from all of £645,480, or an average of a little over $10 per ton.

IN Western Australia the output of gold continues to increase, and the mines promise a great future for that industry in the colony. Yet it will be impossible for some time to float any of these mines in the London market on account of the great amount of overcapitalization of the past two years. The output for the first three months of 1897 was 113,208 ounces. Last year the total output of the colony was 281,265 ounces.

THERE are, according to the *Mining Investor*, of Colorado Springs, mines at Cripple Creek which are making a profit, but which under more able management would be earning double the amount, and others, operated at a loss, which could be made to pay if properly handled. This is a story as old as mining. There are few mine owners of little experience who do not believe themselves capable of managing their own properties. Until it becomes the custom to employ trained managers and pay good salaries this condition of affairs will last.

THE African mines in the Rand, in spite of all the troubles with the native labor and governmental restrictions, are rapidly increasing their output. The yield for April is returned as 235,699 ounces. This shows an increase over the previous month of 3020 ounces, although April was one day shorter. The increase over April of 1896 was 58,992 ounces. The total for the first four months of this year was 888,593 ounces. If this rate is only maintained until the end of the year, the total will exceed that of last year by 385,000 ounces, or about $7,750,000.

SPEAKING of the troubles caused by the railroads and smelters in raising prices in Utah the Tintic *Miner* says that an impression is gaining ground that the railroads and smelters, seeing the suicidal effect of their action, will reconsider the recent advances. The proposition of a special session of the Legislature for the enactment of an anti-pooling and anti-trust law is also receiving much attention. The question of building a smelter is also coming in for its share of attention, but is not generally regarded as feasible, owing to the fact that even if a smelter was built adjacent to the district it would be as much at the mercy of the railroads as are the mines at present. In the meantime a state of unrest and uncertainty exists, and business in all parts of Tintic has suffered severely.

ACCORDING to the *Mineral Industry* the total value of the mineral and metal production of the United States in 1896 was $751,732,782, an increase over 1895 of $18,791,264. In gold the total production was $58,660,637, or $11,830,437 more than 1895. The production of silver was 56,222,322 fine ounces, or 9,891,807 ounces more than the previous year. The pig iron production was 8,623,127 long tons, a decrease of 821,801 tons. Coal production amounted to 187,373,477 tons, being 1,922,167 tons less than in 1895. The production of copper was the largest ever reported, being 467,822,973 pounds, or 81,359 pounds increase. The production of lead was 174,792 tons; of spelter, 77,637 tons; of quicksilver, 133,480 flasks; of alum, 77,700 tons; of cement, 8,487,265 barrels, and of salt, 13,354,573 barrels. The production of gold, silver, copper and pig iron is greater than that of any other country in the world, and that of coal is exceeded only by Great Britain.

THE annual report of the Anchoria-Leland mine of Cripple Creek, Colorado, shows that there were produced 3832 tons of smelting ore, having a gross value of $300,439.56, the average value per ton being $78.40. There were 1207 tons of mill ore of a gross value of $23,981.67, or an average per ton of $19.87. Lessees produced 504 tons, of a gross value of $29,392.14; average per ton, $58.31. The total shows 5543 tons, with a gross value of $353,813.31. It is stated that, with low treatment charges, they could mine all the ore in the vein, both high and low grade together, and, after a slight sorting out of the high grade, send the rest to the mill. In this way the mining and sorting expenses would be greatly reduced. As it is now, they are compelled to work only the richer bodies, which are often narrow. It is estimated that there are from 10,000 to 15,000 tons of ore, averaging from $10 to $20 per ton, now in the five dumps that were made from ore and waste hoisted from the Chance and Maloney veins.

A WASHINGTON dispatch states that Mr. Preston, the Director of the Mint, has about completed his figures of the gold and silver production in the United States during the year 1896. He finds the production of gold to have been about $53,000,000, an increase of over $6,250,000 as compared with 1895. The production of silver is given as 57,700,000 fine ounces, an increase of 1,900,000 ounces over 1895. The principal gold-producing States, with their product last year in ounces as compared with Mr. Preston's figures for 1895, are given as follows: California 721,600 ozs., decrease 571; Colorado 708,006, increase 64,372; Montana 189,066, decrease 9339; Arizona 125,980, increase 30,908; Idaho 104,265, increase 18,177; Utah 97,006, increase 31,487; Alaska 97,445, increase 19,305. The production of silver is given in ounces as follows: Colorado first with 22,573,000, decrease 825,500; Montana 14,432,000, decrease 3,137,100; Utah 8,100,000, increase 632,000; Idaho 4,550,000, increase 1,439,400; Arizona 1,705,000, increase 718,100.

J. J. VALENTINE, President of Wells-Fargo & Co., has issued his annual estimate of the product of gold and silver in the Northwest for 1896. According to this, the output in Oregon was: Gold, $1,950,204; silver, $121,784, against for 1895, gold, $1,649,785; silver, $102,645. The yield was, therefore, considerably greater than ever before. This is in large measure due to the quartz mines of the Baker City district and the increased activity in gravel and quartz mining in Southern Oregon. In Washington the figures for 1896 are: Gold, $353,350; silver, $170,500; against, for 1895: Gold, $349,817; silver, $202,650; a total decrease of $28,617. In Idaho the returns are: Gold, $2,652,500; silver, $5,572,682, for 1896; and, gold, $2,521,000; silver, $4,905,898, for 1895; an increase in gold of $666,784 and in silver of $131,500, or a total of $798,284. The Montana yield is given as: Gold, $4,625,000; silver, $32,645,500; which is very nearly the same as the figures for 1895. The United States Assayer returns the Montana yield as: Gold, $4,380,671, and silver, $20,324,877.

Practical Notes on Hydraulic Mining.*

NUMBER IX.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE H. EVANS, C.E., M.E., General Manager Cons. G. Mines of Cal., Ld. Oroville, Cal.

Strength of Hemp, Manilla, Iron and Steel Rope.—This subject is a most important one, and every superintendent and mine foreman should be thoroughly conversant with the mode of calculating the breaking strain, and, more particularly, the safe load that ropes of different material will stand, as the lives of the men employed, especially in deep mines, are dependent entirely upon the safety of the ropes used in hoisting, etc.; in fact, men working in mines have a right to demand that the employers have a thorough knowledge of this subject.

A simple test for the purity of manilla or sisal ropes is as follows: Take some of the loose fiber and roll it into balls and burn them completely to ashes, and, if the rope is pure manilla, the ash will be a dull grayish black. If the rope be made from sisal, the ash will be a whitish gray, and if the rope is made from a combination of manilla and sisal, the ash will be of a mixed color.

For calculating the breaking strain of round ropes of different materials, the following table is one of several: Where B = breaking strain in tons, and C = circumference of rope in inches.

B = $C^2 \times 0.277$ for hemp rope.
B = $C^2 \times 0.2$ ordinary fiber rope.
B = $C^2 \times 1.5$ iron wire rope ordinary.
B = $C^2 \times 2.5$ steel wire rope.
B = $C^2 \times 2.09$ flexible galvanized wire rope.
B = $C^2 \times 2$ 60 extra flexible galvanized wire rope.
B = $C^2 \times 4.18$ plough steel rope.

The working or safe load should be taken as about $\frac{1}{6}$ or $\frac{1}{7}$ of the breaking load B, or $\frac{B}{6}$.

The weight of ropes can also be approximately calculated from the circumference, as follows: Where W=weight of each 100 feet in pounds, and C=circumference of rope in inches, as follows:

$W = C^2 \times 4.16$ for each 100 feet of hemp or fiber rope.

$W = C^2 \times 14.54$ for each 100 feet of iron or steel rope.

A splice weakens a rope about one-eighth, and it is well to remember that a three-strand rope is about one-fifth stronger than a four-strand one of the same dimensions.

The Bursting and Working Strain of Iron and Steel Pipes, Plates, Etc.—Under this head I will deal only with wrought-iron and steel pipes as are generally used in connection with mining work, and in arriving at the safe working strain or pressure it must be understood that the following rules depend upon good workmanship, correct diameters and distance apart in riveting, etc. In making wrought-iron pipe care must be taken to have the plates rolled lengthwise, as it generally affects the strength of the longitudinal seams—that is to say, the plates should be rolled across the grain and not with it.

The simplest method of calculating the pressure that wrought-iron and steel pipes will stand is as follows: $P = \frac{T \times t}{R} \div c \times f$.

Where P=safe working pressure.

T=tensile strength of plates, taking iron at 48,000 lbs. to the square inch and steel at 75,000 lbs.

t=thickness of plates in inches or decimals of an inch.

R=radius of pipe in inches.

f=proportional strength of plates, as follows: When double-riveted=0.7 and single-riveted=.5.

c=a coefficient or factor of safety usually taken at 3.

p=pressure in pounds per square inch due to head of water.

Example: What is the safe working pressure for a 36-inch pipe, double riveted along the longitudinal seams, and made from wrought iron plates rolled across the grain, and $\frac{1}{8}$ of an inch thick? Answer:

$$P = \frac{\overset{T}{48000} \times \overset{t}{.125}}{\underset{R}{18}} \div \underset{c}{3} \times \underset{f}{0.7} = 77.7 \text{ pounds to square inch,}$$

or 179 feet pressure head.

By means of the same formula, the thickness of plate is easily found, that will safely stand any given pressure; for instance: $t = \frac{P \times R \times c}{T \times f}$

Example: Having a pressure of 179 feet, or 77.7 pounds to the square inch, what thickness must the wrought iron plates be for making a pipe 36 inches in diameter? Answer:

$$t = \frac{\overset{P}{77.7} \times \overset{\text{radius}}{18} \times \overset{c}{3}}{\underset{T}{48000} \times \underset{f}{0.7}} = .125 \text{ in.}$$

With reference to the difference between the strength of drilled and punched holes, it has been determined by experiment that the loss of strength in the metal between the rivet holes when drilled is practically nothing, or, to give the summarized result, the loss when drilled lengthwise was but 1.13 per cent, and when drilled crosswise the loss was only 0.9 per cent, while, on the other hand, experiments made by Mr. Kirkaldy on punched plates showed the mean loss to be 13 per cent with the grain and 17.26 across the grain. Although the result of experiments has conclusively proved that the strength of plates is greater with drilled holes than with punched holes, the extra cost occasioned by drilling would not make up for the extra strength obtained, except in particular cases; and with regard to wrought iron and steel pipes for mining purposes, the effect of drilling or punching need not be taken into consideration, but at the same time I thought it would be interesting to some readers to learn the difference in strength between the two methods.

Methods of Treating Alluvial Deposits in Large Quantities, Where Sufficient Fall is not Available, Sluices, Grades, etc.—Under this heading, I will first deal with what is known as the "Hydraulic Elevator," which is the simplest and most economical machine connected with mining alluvial deposits, where, by lack of grade, it is impossible to run bedrock sluices, or when it is impossible to secure a good dump at the end of sluices to keep them running in a proper manner. The elevator also enables large areas of ground to be profitably mined in districts where the debris law is operative, by means of lifting the material into restraining dams, etc.

In this country, with such water facilities, there are thousands of acres that can be profitably worked by means of an elevator; but, owing to the heavy cost, weight and poor efficiency of the elevators used in California, it appears to be regarded by miners that, to work an elevator, it is necessary to have excessive heads and small lifts, or, in other words, one must have a large quantity of water, or it is of no use trying to mine with an elevator.

Now, this is practically correct, when the clumsy and costly machines that have been the custom for years past are considered. It is far from correct when considering the hydraulic elevator now in the market and manufactured in San Francisco, for which patents have been granted to the writer.

I do not in any way wish my readers to think my remarks here are for the purpose of advertising these elevators, for my personal benefit, and, to be frank with all, I may state that in making arrangements for the manufacture of these machines I agreed upon a price to be charged that only carries an ordinary manufacturing profit, and the amount of royalty received on each machine is but $75, my aim being to assist brother miners and with that end in view did not insist on such exorbitant royalties as has been the custom in connection with other elevators. I feel a little diffident about pushing forward the many claims in regard to cost, weight, efficiency, etc., and would much rather any one interested would write for particulars from the manufacturers in San Francisco—the Risdon Iron Works.

What I wish to impress upon readers is that if they have a piece of ground that is too low for ordinary mining and have only a few inches of water under pressure, do not think it is impossible to work it by means of an elevator. I had charge of a large hydraulic claim in New Zealand, where with less than 400 inches of water under a working head of 225 feet I lifted sand and gravel to a height of 52 feet, and each twenty-four hours handled from 2000 to 2400 tons, and for one year elevated at the rate of an acre each month to a depth varying from 30 to 35 feet banks. Of the quantity of water used, only 250 inches was taken by the elevator and the remainder by the giant for piping. The elevator was connected upon the surface, and instead of going to great expense, as is usual in this country, to sink shafts to bedrock before placing the elevator, we let the elevator do its own sinking, and in less than a week the machine had excavated its own shaft to bedrock, a depth of 43 feet through some bad running ground, which is much better than sinking by hand, timbering through running sand, let alone the expense of pumping, etc.

(To be Continued.)

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Gold in Black Sand.

TO THE EDITOR:—In your issue of December 26th last, in an article by the writer on the Snake river placers, reference was made to the alleged values contained in the black sands, aside from their free-gold contents. Since then a closer investigation proves those values to have been much overestimated.

From the tailings of some of the machines being worked on gravel, averaging from 50 cents to $1 per cubic yard, samples were taken and carefully panned with quicksilver to separate the fine gold still remaining in them. The gold thus recovered indicated a loss in the tailings of from 5% to 10% of the amount saved by the machines, showing a reasonably close saving when the fine and flaky nature of the gold is taken into consideration. There is every reason to believe that a more careful and skillful operation of the various styles of machines in use would still further reduce this loss.

The residual black sand was principally made up of hematite and magnetite, in which were numerous rubies and other beautiful though minute crystals.

The magnetite was first separated by the use of a small magnet, and on being assayed showed but a trace of gold. The hematite, in which the gold was supposed to be encased, was then assayed and gave returns of $4 per ton of hematite. When the fact is taken into account that the hematite does not usually exceed 5% of the original gravel, it will be seen that the margin of profit above the cost of concentration and treatment by any practical known process is small.

Probably the greater part, if not all, of the gold found by assay in the hematite will be seen to be in a free though in an invisibly fine state, which a closer saving by the machine process would greatly lessen.

There are a considerable number of miners operating in a small way along the river on the higher bars at present. When the water goes down again, which generally takes place about August 1st, a much greater number will find employment along the river banks on the low bars now from six to ten feet beneath the water.

There is considerable interest being manifested by professional men in the problem of working the placers on a large scale, one mining engineer having spent the whole winter in diligent investigation, principally with a view of working them by the cyanide process, but with what result we were unable to learn.

W. H. WASHBURN.

Huntington, Oregon, May 11, '97.

From Mine to Mint.

NUMBER III.

By D. K. TUTTLE, Ph. D., Melter and Refiner of the United States Mint at Philadelphia.

Recovery of the Silver.—The silver solutions, together with the wash waters from the gold treatment described, are transferred to a large precipitation tank having a capacity of some 2000 gallons. This is never filled to its full capacity, since abundant room must be left for stirring and rousing the contents. Salt water is now run into the silver solution until a test shows that enough has been added to convert all silver present into chloride. An excess is avoided, since silver chloride is slightly soluble in salt water. The contents of the large tub are now drawn off through a filter. This is a wooden tank 6½ feet long, 3 wide and 1½ in depth, lead lined and provided with a perforated false bottom. The bottom and sides of this tank are carefully covered with cotton cloths as a filtering medium. The curd-like silver chloride is run into this filter through a large wooden stopcock. The liquid which drains off is returned to the filter until it runs clear, after which it is passed through several traps to the sewer. Fresh water is passed through the chloride until all soluble matters are removed, when it is allowed to drain. The filter tank is mounted on low wheels for convenience of removing the chloride to the reducing vat. This is again a lead-lined rectangular tank. The silver chloride is transferred to this tank by means of a copper scoop shovel. Hot water is run on, and granulated zinc added in sufficient quantity to reduce the chloride to metallic silver. The addition of sulphuric acid hastens the action and serves to dissolve the slight surplus of zinc which it is necessary to use to insure complete conversion into metallic silver. The reduced silver is now taken out with a copper scoop having a shovel handle and put into a filter colander, such as we described previously when speaking of gold treatment. In this colander the silver is washed with hot water until entirely sweet. It is now ready for compression into solid cakes by hydraulic pressure. These cakes are dried in a current of hot air, when they are ready for melting. This is usually done without fluxes, and the resulting bars have a fineness of 0.998 to 0.999.

The Sulphuric Acid Process.—Thoroughly satisfactory as is the nitric acid process, so far as its effectiveness is concerned and the high grade of gold and silver which it yields, yet the comparatively high price of nitric acid and the necessity of using either platinum or porcelain vessels led to its being superseded in modern plants by the sulphuric acid parting process. Diluted sulphuric acid has no action on silver, but the strong acid, when heated, is decomposed by that metal, giving off sulphurous acid and forming silver oxide, which passes into solution in the excess of acid as silver sulphate. If gold is present in moderate percentage, say not to exceed one-third of the whole, strong sulphuric acid will extract the silver and leave the gold as a granular brown sediment. Should the bullion contain anything like one-half gold, the latter metal will protect the silver against acid attack, and the result will be failure. It is, therefore, the business of the refiner to adjust for the melting pot gold deposits with those of silver carrying small quantities of gold, or, failing such, to add fine silver so as to have from two to three parts of silver for each part of gold. Such an admixture is melted in a large crucible, thoroughly mixed, and then, with a "dipping cup," is poured into cold water, as described in speaking of the nitric acid process.

But the proper adjustment of silver to the gold is

not the only point requiring care. Most bullion coming to the refinery contains varying quantities of copper, and this metal works very badly in strong sulphuric acid, although we found that metal the least objectionable one in the nitric acid treatment. While decomposing the acid with formation of copper sulphate, the latter, unlike the silver sulphate, is insoluble in oil of vitriol, hence, if present in any considerable quantity, copper soon acts as a protector to the bullion and the chemical action either ceases or becomes tediously slow. Besides apportioning the silver to gold, it is necessary, therefore, to so combine deposits that the granulations do not contain more than 6 to 8 per cent of copper.

Dissolving the Silver.—The success of this beautiful process really depends upon the happy observation that while weak sulphuric acid rapidly dissolves iron, yet, if the acid be strong enough, it has no appreciable action—just the reverse of its relations to silver. Cast iron vessels may, therefore, be employed. A cast iron kettle will last for years, during which time hundreds of tons of silver may be dissolved in it by boiling oil of vitriol. Large iron kettles are used, weighing half a ton, mounted over a furnace. Into this a charge of 300 to 400 pounds of the granulated bullion is placed, and covered with three or four time its weight of acid—66 B. Heat is applied, when a lively evolution of sulphurous acid sets in, which, if too violent, must be checked by the addition of a little cold acid and slackening of the fire. This boiling is continued for several hours, during which time the escaping and consumed acids are gradually replaced. When the solution is complete the fire is withdrawn and the contents of the kettle allowed to quietly settle. A little cold acid is added to aid the precipitation of any suspended gold. Hoods over the kettles carry off the fumes to condensing and suppression apparatus.

The strongly acid solution, while still hot, is siphoned off into the "reducing houses." These are long, rectangular vats lined with lead, and provided with sloping covers like the roof of a house. These covers are hinged to what would be the ridge pole, and are counterbalanced so as to be easily raised. Slabs or ingots of metallic copper are placed on the bottom and sides of these vats, which are then partly filled with cold water. The hot silver solution is then run in. A live commotion ensues, as will readily be imagined when one recalls the heat evolved by the mingling of cold oil of vitriol with water. In this case the acid is nearly at its boiling point, which is greatly above that of water, and the resulting crackling and spluttering must be seen to be appreciated. The result is a weak solution of silver sulphate, rendered milky by the separation of fine crystals of that salt, the solubility of which is very slight in pure water. The copper immediately begins to precipitate the silver as a beautiful crystalline moss, easily detachable from the plates when the operation is complete. This requires about twenty-four hours. Meanwhile the copper has taken the place of silver, and we have now a strong solution of copper sulphate (blue vitriol). This blue solution is drawn off for crystallization, and the spongy silver carefully transferred to leaching tubs for thorough sweetening with fresh water. The silver, now in the form of minute, flaky crystals, is compacted into cakes by means of hydraulic pressure and these cakes dried in a current of warm air, after which a simple fusion in a black-lead crucible without fluxes gives a bullion 0.998 or 0.999 fine. If silenium or tellurium is present in the bullion, it will pass into solution with the silver and be deposited with it by the copper plates. In this case the spongy silver will be dark colored and the melt will be brittle. It must then be fluxed with niter.

The sulphate of copper is a staple article of commerce, and is carefully prepared for the market. When sold, the proceeds should materially reduce the expense of parting the bullion. But, unfortunately, while the materials for its production, the acid and copper, are purchased out of the fund arising from the collateral charges from the depositor, yet the product, blue vitriol, is by present ruling treated as "waste product," the proceeds from which when sold must be turned into the general treasury instead of the refinery fund.

We left the gold as a sediment in the large iron dissolving kettle. A small quantity of fresh acid is added and the gold then removed to a smaller vessel by an iron ladle, perforated with holes. It is transferred to another iron pot, in which it receives a number of repeated boilings with fresh strong acid. There are not less than five such boilings. The finishing acids are siphoned off and used upon fresh charges of bullion. The gold is now transferred to a tub, in which it is washed first with cold water and then with hot. These washings find their way to the silver precipitating tanks. It is now transferred to a lead-lined vat mounted upon a truck. This vat has a perforated false bottom, which is carefully covered with cloth, the whole constituting a large movable filter. Water is now passed through the gold in this filter until it is entirely sweet. If the gold is in coarse particles it may be dried and melted without danger of its being mechanically carried off while placing it in the crucible, but if very fine it is compacted into cakes while wet by hydraulic pressure. These cakes are dried, as were those of silver, in a current of warm air, and melted in a graphite crucible. A trial sample is taken to see if the metal is tough. The presence of even small quantities of lead will render the gold brittle, in which case it is fluxed with niter through an "eye" in a cover of bone ash. When tough, it is ladled into iron molds. About 6000 ounces constitute such a bar melt. The bars are worth about $8000 each.

(To be Continued.)

Permanence in Depth of California Gold Mines.

Waldemar Lindgren, in his book on the quartz veins of Nevada City and Grass Valley, published by the U. S. Geological Survey, has the following to say as to their permanence in depth:

It is certain that the experience with many of the smaller bodies of ore is that they give out or pinch at varying depth. Others, again, have continued to the greatest depth at which the exploitation of the mines has been carried on. Similar relations prevail in regard to the large ore shoots. While some have been found to cease in depth—the Sierra Buttes mine, in Sierra county, being a well-authenticated example—others continue to the deepest levels as strong as or stronger than in the upper part of the mine, the Kennedy mine, in Amador county, being an example of the latter class.

The frequent local irregularities of most shoots make it very difficult to affirm, without extensive explorations, that the end of any certain ore body has been reached. Owing to the habit of immediately distributing all of the profit as dividends, reserve funds for exploratory work are seldom available, and a local impoverishment in a level has often been sufficient to close a good mine. Experience with the large shoots is still sufficient for safe generalization.

The ore shoot of the North Star extends for a distance of about 2500 feet in depth, measured along the plane of the vein. When approaching the sedimentary area to the west, it was cut off or divided into stringers. Still, the explorations are scarcely extensive enough to affirm that its end has been reached; its continuation may be found, or a parallel shoot may be found in depth. In the case of the large Empire shoot a complication has arisen, due to a split of the main vein, reducing the tenure of the ore by dividing it on three veins. The Eureka-Idaho shoot has held its own remarkably well and uniformly over a distance of over 5000 feet, though the richest part of it was probably found in the Eureka and the western part of the Idaho ground.

High-grade ore is now mined in the Maryland mine on the same shoot at a vertical depth of 1500 feet, and a small ore shoot was found near the bottom of the Idaho shaft at a depth of 2200 feet. As gold-quartz veins of fair grade occur near the summit of Banner hill, at an elevation of 3800 above the sea, or 3500 feet above the bottom of the Idaho shaft, we have in this district within short distance a vertical interval of 3500 feet within which there is no evidence of any gradual change in the character or quality of the ore. Again, in the vicinity of Washington, Nevada county, excellent quartz is mined 600 feet below the river level, in the Eagle Bird mine, and on the ridges north of the river 2000 feet above the river level. In this distance there are no distinct differences in the quality of the ore.

Many smaller veins carry only one ore shoot, but in the larger fissures there are generally several of them. There is a strong probability that in such veins thorough exploration laterally or in depth will develop new bodies of ore if the one on which exploitation has been carried on is found to pinch out. The question will naturally arise as to whether, with increased depth and cost of mining, it will be a good venture to carry on the necessary dead work. This will have to be decided by the record of the mine and the character of the fissure.

It is generally conceded now that the fissures are, comparatively speaking, surface phenomena, and that below a certain depth, where plasticity and flow of rocks under pressure come into play, open spaces can not exist. This limit Prof. Heim, for instance, places at 16,000 feet, while Prof. Van Hise, basing his consideration on the strength of rocks, arrives at 33,000 feet as the maximum limit for hard rocks in which fissures can exist. Even the lowest of these estimates far exceeds the depth of practicable mining. But it is not likely that all fissures continue until that limit. On a small scale the discontinuance of fissures may be observed in extensive sheeted outcrops. It is also an incontestable fact that many small veins close up in depth, while others continue unchanged. In considering the probable permanency of a given vein, its general character must be taken into consideration. Continuous well-defined outcrops and large bodies of quartz are in general good indications of the maintenance in depth, as is also any evidence of strong faulting and movement. Some quite extensive veins, though, have relatively short outcrops. Thus, the Eureka-Idaho practically shows croppings only for a distance of 2000 feet, but within that distance they are very prominent. Those of the North Star are less than 2000 feet long. From the developments to the east along the Omaha system it is pretty certain that the vein does not continue far across in that direction. A fissure which can be definitely proved to extend only a short distance will in all probability be found to be correspondingly limited in depth. In regard to probable permanency of the vein in depth, the Ural and Merrifield, along which extensive faulting has taken place, stand first in the districts.

In scrutinizing the scant statistics of the production, in tons and value, of the Grass Valley district, it can not be denied that they show on the whole a distinct increase. There is also a distinct decrease in the average value of the ore. It is not safe, however, to draw too far-reaching conclusions from these data, because there are many factors involved: The cost of treatment and mining has decreased greatly by reason of the modern methods introduced, and more low-grade ores are now milled than formerly; nor are there any rich surface ores left to swell the grade.

Leaving the difficult question of deep mining out of consideration, there are, however, in both districts a large number of veins which have been only slightly developed, but which with improved methods may be converted into paying mines. The development of these will probably maintain the production of the district for many years in the future, even if no new ore bodies are discovered in the old mines.

It can be confidently stated that there is no gradual diminution of the tenor of the ore in the pay shoots below the zone of surface decomposition. Within the same shoot there may be many and great variations of the tenor, but there is certainly no gradual decrease of it from the surface down. This important fact has been previously stated by those conversant with the veins, such as Prof. Silliman and Mr. J. A. Phillips. The statements to the contrary, for instance, by Mr. Laur or Mr. Reyer are due to imperfect acquaintance with the facts and generalization from insufficient premises.

Cheap Milling and Mining.

At the request of the editor S. R. Porter, superintendent of the Baliol Gold Mining Company, at Sutter Creek, Amador county, California, has sent the following interesting and valuable data as to the low cost at which mining and milling may be done under careful management and favorable conditions:

To the Editor:—I have your favor of the 21st inst., making inquiries for publication in the Mining and Scientific Press of the cost of mining and milling ore by me as superintendent for the company. Knowing that data of actual runs and expenditures are of great interest to those who are engaged in the mining industry, to them I most cheerfully submit the following:

The ore was excavated from an open cut 75x125 feet, from which it was dumped into a chute and trammed 700 feet to another chute, where it was again trammed 800 feet to ore bin at mill, thus requiring the ore to be handled twice and trammed a distance of 1500 feet.

No timbers have been used thus far in the cut.

The mill which I operate is forty stamps, of 1000 pounds each, with a 4-inch drop, making 102 drops per minute, with a 9-inch die. Forty-mesh perforated tin screens are used in batteries to plates. The mill was closed down sixty hours during the month of April.

The following is a copy of my report as transmitted to the president of the company for the month of April, 1897:

THE COST OF MINING FOR APRIL.

534 days labor mining	$1,145 50
25 days blacksmith, sharpening	60 00
1275 lbs. powder	102 00
5 boxes caps	2 50
2200 ft. fuse	11 22
30 days lighting, miners' candles	7 50
310¼ days labor tramming ore	647 12
30 days lighting, trammers' candles	7 50
5 gallons coal oil for lamps	55
Oil for cars	2 83
Total cost of mining and delivering 5885 tons of ore	$1,986 72

MILL REPORT.

I had in ore bin on May 1st 300 tons of ore, which was the same amount brought forward the previous month. This will give me the full 5885 tons as mined also worked in the mill.

THE COST OF MILLING FOR APRIL.

118½ days labor on batteries and plates	$ 382 00
61½ " " " concentrators	168 00
44 " " " rock crushers	101 25
94 " " " ore bin	188 00
Mill repairs	161 27
Mill expense	60 12
Mill lighting	28 06
Power water supply for April	480 00
Total cost of running mill for April	$1,546 70

Cost of mining and delivering 5885 tons of ore.....$1,968 72@.33$\frac{4407}{5885}$ ₱ ton.
Cost of milling, do..... 1,546 70@.26$\frac{1860}{5885}$ "

Cost of mining and milling.$3,533 42@.60$\frac{242}{5885}$ ₱ ton.

Yours respectfully,
S. R. Porter, Superintendent.

It will be observed that forty stamps crushed 5885 tons of rock in twenty-seven and a half days, or an average of 5.35 tons per stamp each twenty-four hours.

Mining Summary.

CALIFORNIA.

Amador.

Dispatch: The concrete foundation for the new 40-stamp mill at the Argonaut mine is being laid, and the framework of the mill will soon be under way.

The Zeila is expected to resume operations with a full complement of men about the first of June.

Work at the Kennedy goes on in the usual matter-of-fact way. Work of putting the new hoist over the north shaft is progressing favorably.

Republican: The work of sinking at the Pocabontas mine is going forward well. The flow of water has been disposed of by means of a bulk head. The Potosia ledge is expected to be tapped by means of a crosscut at the 350-foot level. A payment of $4,500 on the purchase price of this mine was recently made.

The Iron Mass mine, near Volcano, under the superintendency of A. B. McLaughlin, has recently added a 20 H. P. engine, which will furnish power for the hoist soon to be erected.

Butte.

Register: At Merrimac the Bloomer Hill quartz mine has closed down for the present. The Little Hope quartz mine gives employment to a number of men. On the Branhan mine, near Merrimac, an 8-stamp mill is being erected. The drift on the ledge shows good ore.

The mine in which Ekman, Spangler, Haynes and Faul are interested, shows good ore and work is being driven ahead on the ledge.

Calaveras.

Dispatch: At the Gwin the rich streak in the ledge still continues in the 1300-foot level north from the shaft. This strike was made in new ground, and was never thought of under the old regime. A new shaft has been decided upon, and it will be located south of the old works.

Chronicle: At the Eclipse gravel mine an upraise is now to be made from the tunnel into the channel.

Mountain Echo: Work is to be resumed on the Charter Oak mine in Washington Flat mining district. The shaft is to be sunk 100 feet, when the vein will be crosscut.

Citizen: C. L. Meyer of New York and R. C. Mueler of France are investing in mines near Sonora and at Angels. They have secured a bond on 800 acres in the vicinity of Angels from C. Tryon.

D. Fricot is making arrangements to develop the Fricot group of mines, situated on San Antone ridge. A tunnel nearly a half mile long will be driven from O'Neils creek to tap the entire group.

El Dorado.

Republican: The Veerkamp Bros. are opening up the Grey Eagle mine and are sinking a new shaft on the ledge, which prospects well.

The work on the Marquart & Hancock gravel mine is progressing well. They have several hundred feet of tunnels, with 1350 carloads of gravel on their pay dump.

Mountain Democrat: Another rich strike has been made in the Never Sweat mine, near Diamond Springs, about $6000 having been taken out.

Inyo.

Los Angeles *Times*: Panamint mining camp, now attracting the attention of so many prospectors and others, is about seventy-five miles from Randsburg. The nearest and best road is by way of Garden station and Borax lake, going north between the Argus and Slate range of mountains until nearly opposite Postoffice springs, then crossing over Slate range on a fairly good grade road, thence down across Panamint valley.

The next water station on the road is at the borax works on Borax lake, where water is piped from the Argus range a long distance. Here a charge of 25 cents is made for watering a team, with an additional charge for hauling water away. Here a great deal of money has been expended in erecting expensive buildings, putting in costly machinery, houses for the men, vats and tanks to manufacture borax.

The next water station is Postoffice springs near the new town of Ballarat, and the distance thirty miles with Slate range to cross to reach it.

Ballarat is the new town built in the open valley, near the new mines, and will doubtless be the distributing point for supplies entering the camp for all the region embraced in the Panamint country. It now contains about a dozen houses and as many tents, with several new houses in course of erection. It also has several stores, two saloons and one feed yard.

Mono.

Chronicle-Union: Everything is running smoothly at the Dunderberg mine, and the full force of the mill, 30 stamps, will soon be running. The mine is looking well. About twenty men are now at work.

Nevada.

Telegraph: The South Idaho a short time ago was closed down for want of funds. Now money has been received to pay off most of the indebtedness from A. B. Benedict now in New York. It is the intention of Mr. Benedict to operate more than one mine, as he has a strong company behind him, composed of New York and Philadelphia capitalists. Everything is now satisfactory and the South Idaho will soon be working again. The South Idaho is the mine owned by E. C. Webster. The other called by that name is the South Idaho Consolidated and is owned by Joe O'Keefe and others.

Placer.

Herald: The new mining machinery for the Gold Blossom mine in the Ophir district, owned by C. F. Reed, is being put in. An air compressor and new machinery throughout will be put in operation, and it is quite probable that a large force of men will be put on this summer.

Sentinel: County Surveyor C. E. Uren has in preparation drawings of a restraining dam across Squire's canyon, near Dutch Flat, to be used by Nicholls Bros. on a permit to hydraulic. The logs of the dam will be 213 feet long across the canyon, and at the highest point it will be 60 feet, giving a capacity of 400,000 cubic yards. The principal mine to be benefited is the Abeel claim, owned by the Nicholls Bros., Dutch Flat, though other claims will probably be given permission to dump.

Plumas.

National Bulletin: Messrs. Marsteller, Baker and Kelley of Susanville have purchased of T. D. Bennett a gravel mine in the upper end of Mohawk valley near the Jackson mine. The new owners propose to open up the property as soon as possible.

At the Thistle shaft efforts to pump the water out of this mine continue, but the progress is slow. The great body of water has been lowered in the shaft only 15 feet since the work of pumping began this spring. At the beginning the water in the shaft was 56 feet deep.

J. F. Cummings and San Francisco men have purchased of Goodwin and Thompson the Bushman gravel mine north of Quincy. The new owners will soon begin development of the mine. It will be necessary to run 500 feet of tunnel to bottom the channel.

San Diego.

Ramona *Sentinel*: At Julian in the Washington mine the workmen have uncovered a ledge 2 feet wide of solid ore, running high in free gold.

Shasta.

Free Press: On the Shasta King group on Squaw creek the ore vein is well defined and is from 16 to 45 feet in width. The ledge has been traced for 4,000 feet. The ore is base and can only be reduced by the smelting process. It carries good values in gold and silver, with a small percentage of copper, zinc, and other minerals.

Upon the north of the Shasta King group is the property of J. R. Lowdon and Walter Friday. The ore in this property carries the largest percentage of copper of any of those along the lode. The Mammoth group lies still north of the Lowdon and Friday properties, and is the apparent end of the lode.

Mr. Hill, formerly superintendent of the Mountain Copper Company, but who now has a hand in the Windy Camp mines, has a force of men employed in developing that property, with a view to placing it upon the market.

A new corporation, the London Tunnel Company, has been organized under the laws of the State of Colorado, with a non-assessable capital stock of $1,000,000. The company owns the Burton and London mines, on Mule mountain, in the Centerville mining district, and in addition has recently purchased contiguous claims owned by Markwick and others, and altogether making something like 100 acres of ground. Active operations in the development of the property will commence immediately. A tunnel, already commenced, will be pushed for 1,000 feet, which will give a depth of 1500 feet from the surface.

Frank Brightman, superintendent of the Gladstone mine, says that 80 feet from the intermediate Gladstone tunnel he has discovered what will eventually prove a large body of ore. The ledge is 4 feet wide, and thirty tons run through the mill produced about $660 in bullion.

Searchlight: Thirty men are employed on the Milkmaid, purchased by Senator Jones et al last winter of John Souter. Good ore is being taken out at the present time, and the mill in course of construction will have plenty to do when it is completed.

At the Sunny Hill mine the tunnel is now in over 700 feet. Several small veins have been encountered so far. The objective point is still some 600 feet head.

On the Windy group of the Ballakalalla mines, which Alex. Hill is preparing to develop, the ore body is large and work has been done on the same ledge for a distance of 4000 feet. A tunnel has been run in the ore since the bond was acquired that shows a depth of over 500 feet; and although this tunnel has crosscut solid ore for a distance of 120 feet, the opposite wall has not as yet been reached.

The work so far done on the Princess hydraulic mine, owned by Bear & Simonds, disclosed a valuable placer property. The water obtained from Brandy and Boulder creeks has been somewhat disappointing. The ditch is fifteen miles in length, and, being new, a large percentage is lost in seepage, as well as by evaporation.

E. Holden, who discovered some valuable gold, silver and copper properties near Pitt river, on the headwaters of Stillwater, has a small force of men at work developing the find for the Black Diamond Consolidated Mining Company.

Sierra.

Mountain Messenger: At the Northern Belle mine the mill is running steadily day and night.

The upper tunnel in the Prospect mine in Slug Canyon has been driven in to a point under the old works, and an upraise will be started in a few days.

Men are kept steadily at work on eight hour shifts, sinking the shaft at the York quartz mine.

Preparatory work is now being done by I. Copeland on the Independence mine, Wolf Creek, where machinery will soon be placed in position for the purpose of pumping the water from the shaft. The shaft has been full of water for some fifteen years.

The Sierra Buttes mine has temporarily closed down.

Siskiyou.

Journal: Members and employes of the Klamath Flume and Mining Co. have gone down the Klamath river to commence work on their hydraulic mining properties. They have fourteen claims, comprising about 1500 acres of gravel, some of which is known to be rich, and the ditch and flume, which they intend constructing, will deliver 3,000 inches of water on the Happy Camp divide, 680 feet above the Klamath river.

The Chinamen at Buckeye Bar will have their wing dam completed by the 1st of July, when they will commence hoisting.

Humphreys & Quigley, who have been running a tunnel at their Commodore mine for the past six months, have struck the ledge at a depth of 230 feet. The ledge is 2 feet wide, and the ore from all appearances is rich.

The hydraulic mines at Oro Fino will run another month, and the final cleanup will no doubt show that this has been a prosperous season.

The Eastlick Bros., the Wright & Fletcher, and the Gardiner mines have also been working on rich ground.

Smith & Hunter, having reached bed rock in the Greenhorn blue gravel mine, with their shaft, are now fixing up the pumping and hoisting machinery to carry on work in hoisting gravel and keeping the claim drained of water.

The Klamath River Flume and Mining Co. received three carloads of machinery from the north last week, and expect three more carloads in a few days. It is stated that a large supply of water is to be obtained, sufficient to run twenty or more giants in sluicing.

Reporter: On the Klamath Dr. Dean is working quite a crew of men at his mine, which is paying well. The owner intends to build a reservoir so as to run all summer.

The Minnetta B. continues to do well under Mr. Stanley's management. The owners are satisfied with the property and contemplate making a great many improvements soon. They have already made three good clean-ups.

News: A 5-foot ledge carrying a 30-inch pay streak has been opened up on the American mine in Deadwood district. The mine is owned by J. R. Foster and S. J. Fore. A force of men are working in the mine, and ore from the ledge is being crushed in an arrastra.

Trinity.

Journal: James Bowie and James A. Johnson have sold to Bradford, Duvergey and Hall brothers the Johnston Farm gravel mine and water rights on Indian creek. The property consists of 700 acres of land, a large part of which is rich gravel. The consideration of the sale was $25,000. The purchasers are all officials of the La Grange Hydraulic Mining Company.

The Altoona Q. M. Co. has placed its new pump in position at Cinnabar and started it. The company expects in two weeks' time to be able to lower the water below the upper levels. As soon as the mine is pumped dry a large force of men will be employed in addition to those already at work.

Tuolumne.

Union-Democrat: At the Rawhide the main shaft has passed the 1100 and is now being driven toward the 1200, at which point sinking will be stopped and levels run. Stoping still continues on both levels between the 1000 and 800. The vein holds uniformly its width of 30 feet.

At the Providence the main drift is now in 300 feet, showing a well-defined 6-foot ledge of good quartz in the face. In the bottom of the shaft, 110 feet from the surface, high-grade rock is being taken.

In the Black Oak the main shaft has passed the 800-foot mark, with a fine body of rich quartz in sight, although the greater portion of ore reduced comes from the north and south drifts on the 700 level.

The north extension of the Providence has been sold to Miller, Muller & Blodgitt, and a contract has been let to drive the 60 foot tunnel 100 feet further. There is also a shaft 40 feet deep on the property.

A force of six miners were put to work on the Consuelo mine last week. In 1865 the Consuelo was one of the best producers in the State.

Independent: A rich strike is reported in the Green mine at Confidence. This mine in former days was a good dividend producer.

Operations on the Mascot mine on Mormon creek will shortly be commenced by the erection of a 5-stamp mill.

The Jumper people are sinking a new shaft north of the present one.

The Tarantula mine has its gallows frame in place and the whim ready for operation.

The Consuelo mine, on the north fork of the Tuolumne river, has been sold to New York capitalists.

The Santa Ysabel mill is getting its machinery in place, the tramway from the shaft to the mill being about completed.

The Rappahannock is drifting to the north from the main shaft and is putting in a station at the 600-foot level, on completion of which sinking will be recommenced.

The Omega people have begun active operations. They have laid a tramway into the tunnel and will have a force of men employed steadily from this time.

The whole of the country west of the mother lode in the Rawhide district is taken up, and prospecting and sinking go on in all directions.

The Miles claim, a new discovery to the north of the Isabella and Gem, has a 4 or 5-foot vein which shows up well in free gold.

NEVADA.

Dayton *Times*: The Peck concentrating plant in the Douglass mill is completed and ready to start up, with the exception of placing the water wheel, which has not yet arrived. The railroad, the electric lighting plant and all other machinery is in readiness for the start.

Col. Sutherland, who visited the Ely mines at Como a couple of weeks ago in the interest of a Scotch syndicate, has made a very good report of his investigations. The Mayflower mine was sampled very thoroughly for 3000 feet.

Austin *Reveille*: The Gold Park mill will start up in a few days. There is an abundance of ore in sight ready to be taken out. The ledge from which ore is now being extracted is 20 inches thick and will mill high in gold, with a small amount in silver and lead.

Yerrington *Rustler*: The Boston, Nevada, Copper Mining Company is incorporated by New England people. The company will build a 40-ton smelter. In all probability 20 men will be employed in the smelter, and 30 in the mine. It is expected to have the plant completed by July 1st, when the mining and smelting of copper ores in Mason Valley will begin.

Elko *Free Press*: The Dexter Company is enlarging an old shaft on the Coptis ground, which is 100 feet deep, to a 2½ compartment shaft. They intend to sink it 200 feet.

Salt Lake *Tribune:* The miners of Eagle Valley district in Lincoln county have laid off a townsite and called it Deerlodge. There is much prospecting going on since the snow went off. Mining and mill men come over every few days from Stateline.

Johnson and Campbell are developing good ore in the Comstock group.

Vanina and Delmue are down 100 feet on the Charley Ross; one crosscut shows 25 feet of pay ore. James Knight is opening up the Quartzburg claim.

Troutman, Clark & Pickett are sinking in the ore body on the Indiana. Bennett and Delmue have taken out some high grade silver ore from the Interocean.

Moody, Lytle and Hammond's shaft on the Idlewild is down 75 feet, and they are crosscutting the vein, with prospects of having a large ore body.

Walker Lake *Bulletin*: The dump of the Mary tunnel is crowded with ore, and hauling will commence in a few days. The mill will start by June 1st.

The Valcalda Bros. are working ore from their mines.

Reese River *Reveille*: Rich ore has been struck in the Dexter mine; a double compartment shaft is to be sunk at once, and a new hoisting works to be erected.

Other properties in the camp are looking well, and most of the new finds are principally gold.

OREGON.

Baker City *Democrat*: At the Flagstaff mine they are running a crosscut to tap the ledge inside of 30 feet.

Monitor-Miner: The Coast Range Mining Company is preparing for extensive placer mining operations on the Stidham bar on Rogue river.

Observer: The new 5-stamp mill at the old Jewett mine near Grants Pass is completed and will start up soon.

The copper deposits of southern Oregon are attracting quite considerable attention this spring and some good companies are looking this way for investment.

Rich diggings have been reported as being struck on Silver creek that pay $15 per man. This creek was famous in the early days and at one time furnished employment to several hundred men.

G. W. Trefren of Ashland and D. V. Snowgoose propose to put in a pumping and elevating plant to work a gravel deposit below Grants Pass.

Baker City *Epigram*: The Virtue mine, eight miles out, employs about 100 men, and yields upwards of $20,000 per month, with a 20-stamp mill, the ore being free milling, as is all the ore in that immediate district.

The Flagstaff mine has just started a new 10-stamp mill.

WASHINGTON.

Spokesman-Review: At Davenport the Deer Trail No. 2 has sixteen working tunnels and ore in every one of them. The aggregate length of these tunnels is approximately 4500 feet. The manager of the mine reports that he is taking out ore from one body whose area is 200 feet by 400 feet and whose pay streak is 4½ feet thick.

In a few days the first carload of ore from the Mountain Queen mine, owned by the Grand View Consolidated Mining Company, will be shipped.

In Okanogan county the Palmer mountain tunnel is 300 feet under ground. Work has been temporarily suspended on the tunnel until they can get their compressed air plant in place.

The Triune is shipping concentrates, but it is a free milling mine. They are saving 80 per cent of the value on the plates, and the ore is being mined and milled at a total cost of $2.75 per ton.

The Hercules Mining Company is working two shifts on their tunnel on Douglas mountain, and expects to tap the ledge soon.

The Wyandotte company is also at work with a good force of men at both mine and mill.

ALASKA.

Mining Record: A rich lode, carrying gold, silver and copper, has been discovered and located on Cat island, south of Mary island. The claim makes the best showing of any in that section.

Gravina island is literally covered with mining claims. Many claims have been bonded for sums ranging from $20,000 to $45,000.

The Alaska-Juneau Company has commenced work at the mines in Silver Bow basin and stamps are dropping on ore. Extensive development work will begin in a few days if the weather will permit.

BRITISH COLUMBIA.

(Special Correspondence).—Col. Forsyth of Chicago is now developing his claims at the head of Frederic's Arm, in Phillip's Arm district, and is erecting a concentrator. The ledges in this country are very wide, and

some of the properties run rich to the ton. There are over 300 claims in the district. The country is very accessible, and there is wood and water everywhere. Harrison Lake section, within a few miles of Westminster, reached by ferry, is also the scene of great mining activity. In a short time there will be several shippers in this section. The Money Spinner mine is owned by the Fire Mountain Company, who own the two joining claims. A mill site has been chosen and a mill ordered for crushing the free milling rock.

Spokesman-Review: The new management of the Iron Mask at Trail have taken charge. They are working thirty men on the property and are shipping a carload of ore a day. A double shift is at work running a tunnel on the west lead, and the face of the tunnel is now in mineralized rock.

The No. 1, a Rossland claim west of the War Eagle, will soon be in the hands of developers. Larson, Greenough and Geldness have completed the purchase of the one-half interest of George Sohnemann and now own the entire property.

More than 200 mineral locations have been made about Christina lake in the past two weeks and a large amount of development work is being done. Three good strikes were made last week, one by Mr. Montgomery on Sutherland creek, one by the Lattah brothers and one on the Standard on McCrea creek.

The Ontario, adjoining the Mannamead on the North Fork of the Salmon, has been sold by the owners, Adie, Craig, Campbell and Berwick, for $15,000 cash, to parties in Victoria.

Spokane *Chronicle*: At Sandon the Payne has about 4 feet of clean ore in the breast of the fourth level. Shipments of ore will be resumed between the 5th and 10th of June.

A force of men has been at work on the Eureka, adjoining the Slocan Star.

Three drills are now employed in the development of the Slocan Star. They are now in about 650 feet on the fifth tunnel, and expect to strike the ledge in 300 feet more.

At Ainsworth Alex McLeod reports another strike on the Silver Glance on Woodbury creek. The tunnel on the property is now in 100 feet. The ledge is 4 feet wide and the pay streak about 1 foot wide.

A. A. McKinnon and F. L. Fitch have bonded the Kate L, near Ainsworth, to a syndicate represented by Knight of Spokane for $6000, 10 per cent of which was paid down.

At the Currie, on the Galena farm, a compressor is being placed in position.

The Kaslo sampler is handling two or three cars of ore a day. The Ruth is a steady shipper, and the Sunset and Whitewater are sending down ore now.

The Center Star management is pushing the work on its big property with a large force of men. A crosscut is being run through the big ore chute near the west end of the big tunnel. This crosscut has been run 50 feet to the north of the tunnel, and 20 feet to the south of it, or 75 feet altogether, and neither foot nor hanging wall has yet been found. This makes the ore body 75 feet wide up to date.

Preparations have been made for the rapid development of the Mamie claim at the north fork of Lemon creek, the property of the Lemon Creek Gold Mining Company of Slocan City.

Spokesman-Review: The Payne Extension Mining Company is being incorporated to work the group of claims called the St. Paul, Minneapolis, Toronto and Auditorium. This group is the northeast extension of the Payne group and has the same lead.

In the Ainsworth camp 400 miners are employed, the Black Diamond employing about sixty-five.

The fifth tunnel on the Slocan Star is in about 650 feet, and it is thought 950 feet will strike the ledge. Three drills are now used.

The Primrose Mining Company has let a contract for 100 feet on its property on Toad mountain.

The Delhousie has been rebonded for $35,000.

The Maritime Exploration Company has paid $8000 for the Iron Cap.

The Kootenay & Columbia is now a shipper and development work is well along. A tunnel is being driven in the Iron Colt, and they ought to be at the ore bodies in ninety days, when they will have a depth of 300 feet.

The output of the Kootenay mines up to May 22 for this year amounted to nearly $3,000,000 in value. The following are the returns:

ORE EXPORTED.

	Tons.
From Slocan via Kaslo	10,717½
From Slocan via Nakusp	2,642½
From Rossland via Northport	6,479¼
From Rossland via Nelson	52
Total	19,909¼
Through Nelson Custom-house	$1,178,781 95
Through Revelstoke (Nakusp)	292,110 65
Total value	$1,470,892 60
Average value per ton	$73,879

PRODUCE OF SMELTERS.

	Tons.
Nelson (Hall Mines) Matte	582
Trail Smelter Matte	2803¼
Total	3385¼
Total value	$1,504,336 78
Total value of ore and matte exported	2,975,229 38

UTAH.

Salt Lake *Tribune*: At Park City, in the Constellation the drift from the 300-foot level of the old shaft will be rapidly pushed, so as to cut the gold ledge at a depth of about 500 feet below the present 30-foot hole.

Manager Dern of the Mercur says that the mill, with its increased tankage, is now handling very nearly 300 tons of ore a day, and that the mine shows more ore than at any time since its development was commenced.

The owners of the Gold Dust have decided to erect a mill of 200 tons capacity, and will put in crushing machinery that will enable the company to double that at any time the management may deem it expedient.

The management of the Brickyard have decided to make a series of test or experimental runs through the plant that Capt. J. R. De Lamar has erected at the Golden Gate, and the erection of a mill will shortly be commenced.

A report comes from Sunshine that a ledge of galena carrying 50 per cent lead and 18 ozs. of silver has been struck on the north side of the Overland ground.

At Frisco the superintendent of the Cactus Mining Company has received orders to discontinue work temporarily and wait for more remunerative prices for its ores.

Sinking in the main shaft of the Horn Silver mine was resumed a few weeks ago, and the bottom is now almost 1300 feet from the surface. Another 200 feet will probably be sunk before any station is cut and drifting started.

Hall & Higgins have bonded the Dick Bland claim for twelve months from R. S. Lipscomb and John Murray. Three cars of ore have been shipped from this property, which was taken out in sinking a 125-foot incline.

Mercur *Mercury*: One hundred tons a day is the record of the Geyser mill now. Everything is working well in the treatment of the ores, and average values of $5 per ton are obtained therefrom, while the dump shows analysis of from 70 to 82 cents to the ton. The capacity of the mill will be increased.

Two drifts are still being run on the two separate veins in the Wonder—one on the 475-foot level and the other on the bottom or 600-foot level.

Tintic *Miner*: Shipments from this district for the week are as follows: From the Bullion-Beck mine, 15 carloads ore; Centennial-Eureka, 3 carloads ore; Ajax, 5 carloads ore; Mammoth mill, 7 carloads concentrates; Swansea, 5 carloads ore; South Swansea, 7 carloads ore; Star Consolidated, 2 carloads ore; Four Aces, 1 carload ore; Dragon iron mine, 3 carloads ore.

A contract has been awarded for 100 feet of work on the Annandale. The contract price is $9 per foot.

H. Slade and B. Garfield have commenced work on their group of claims at Mt. Nebo.

Eureka *Democrat*: The shaft in the Lily of the West, located about a mile east of the Humbug, is now down 200 feet. A rich strike of gold-bearing rock is reported to have been encountered in the 100-foot level last week.

A new tunnel is to be started on the Uncle Sam near the northwest corner of the claim, which will give a depth of nearly 1000 feet. A shaft is also to be sunk from a point near the mouth of the present tunnel.

Mammoth *Record*: A contract has been let for sinking the shaft on the Cornucopia another 100 feet, which gives a depth of 420 feet.

A streak of excellent looking ore has been encountered in the bottom of the shaft at the Last Chance mine, which is now down 150 feet.

The machinery and lumber for the Alaska have arrived, and when the new hoist is in place the active development of the property will again be resumed.

Bingham *Bulletin*: In the Giant Chief from the new working shaft the vein has been tapped, and there is now showing 4 feet of galena ore. Former assays from upper workings have given over 50 per cent lead and 30 to 50 ounces silver, but the ore from the new strike is higher grade.

The shipments from the Old Jordan are heavier than usual this week.

A 70-ton test lot of copper ore from the vein crossed this spring by the Highland Boy working tunnel is coming down for shipment.

Concentrates are coming down from the Brooks & Co. steam jigs at the Old Jordan. A crusher will soon be running in connection with the jigs.

Sinking was lately done a few feet below the tunnel level of the Nast and ore encountered carrying 76 per cent lead.

The shipments from the Phœnix and Coramandel the past few days foot up about 160 tons.

IDAHO.

Spokane *Chronicle*: In Jerome Creek camp the Daisy, which has been in litigation for some time, is nearing a settlement. The stamp mill will be put in operation again as soon as the settlement can be effected.

The Blackfoot Mining and Milling Company has let a contract for an additional 100 feet on the Gold Nugget.

Some additional work is being done on the Gold Bug; and as soon as the Daisy's stamp mill begins, work will commence on the Gold Bug on full time.

The Gypsy Mining Company has let a contract for a shaft on that property.

Spokesman-Review: The Idaho mine at Murray is to be worked on an extensive scale. The first change will be the addition of canvas tables to concentrate closer, and then there will be an addition of thirty more stamps. The work of putting in these stamps will be begun within thirty days. Altogether in the three veins there is 150 feet of ore that will pay for milling if worked on a large scale and with cheap power, while a large part of it will pay under more expensive methods.

A 10-stamp mill has been ordered for the Badger Gold Mining Company for their property at Elk City. A shaft has been sunk about 100 feet and 200 feet of drifting has been done.

In the Pierce district, placer miners, who depend upon the melting snow and rains for their water supply, are complaining of the scarcity now, and are shutting down.

The American Placer Mining Company has thirteen men at work washing dirt, and are running double crews.

Ex-Congressman Willis Sweet has a force of fifteen men on his property, putting a 5-stamp mill in.

The Bingham Placer Company, near Gibbonsville, expects soon to have five miles of flume completed and the water turned on.

MONTANA.

(Special Correspondence).—Large deposits of gold-bearing quartz have recently been discovered at Libby in addition to the big ledges discovered in late years, among which is the Snow Shoe, where a 100-ton-capacity concentrator is running to its utmost capacity, employing in the neighborhood of 180 men. On the same contact are the Silver Cable group and the Buzz Saw or Shaughnessy Hill group, at each of which places large concentrators are in course of erection. There are two hydraulics working at good pay on Libby creek, and several ledges have recently been unearthed where arrastras, or stamp mills, will be put in. There is a demand for men experienced in the building and handling of arrastras at that point. There is a new paper established at the camp known as the *Weekly Montanian*, with D. A. Hendricks as editor, to whom parties desiring further information might write.

Butte *Miner*: At the Original mine workmen are cutting a station at the 1000 level and in a few days crosscutting will commence.

The Hesperus Leasing Company has commenced crosscutting from the Parrot shaft, and the operators expect to cut the lead which shows up well on the surface in a short time.

The Anaconda company has abandoned the plan of sinking a shaft on the Orphan Boy for the present, one of the silver properties of the company situated west of Walkerville. It was announced some time ago that the company would sink a shaft down 1000 feet.

The German placer bar, near Virginia City, is being worked by a gravel plant, which promises good results. A big scraper car, carrying two tons of gravel at a load, travels along and is perfectly controlled by a system of cables operated to a nicety by levers in the engine-room of the plant. The cables run between the main tower and an "A" frame, probably 150 yards apart. When the car has traveled out to the gravel it is lowered and dragged along the gravel, loading automatically. It is then hoisted back to the main cable and conveyed above the big hopper in the tower, where it dumps its load automatically in the hopper.

The Boston and Montana Company recently started up six furnaces and increased the force of employes about fifty men. This is due to the increased shipment of ore from various mines throughout the district. A further increase in the force will probably be made. Many new changes are contemplated for the near future. Two new blast furnaces are to be added.

Mining World: The Iron Mountain Mining Company is operating a full force of men both at mine and mill. The monthly pay-roll amounts to $10,000. The output is principally of silver.

At Castle there are six mines that are taking out ore and shipping—the Broadwater, the Yellowstone, the California, the Great Eastern, the Judge and the Powderly. The Great Eastern alone is shipping a carload a day. The lease on this property expires in about a year, when the owners will in all probability operate the mine themselves.

At Sheridan in the Caroline on Georgia Gulch the drain tunnel is about completed, and the stoping of ore will be resumed in a short time.

An effort will be made to work Lazyman's Bar on Warm Spring creek, tributary of the Upper Ruby.

Superintendent John Allen of the Kennett mine reports that retimbering the shaft will be finished next week, and that the mine will resume operations immediately.

Inter-Mountain: The Noble mine on Wisconsin creek, Madison county, from which some rich gold ore has been shipped in years past, is bonded to J. P. Reins and others for St. Louis parties in the sum of $100,000.

In his report to the reorganization committee of the Butte and Boston Company, C. W. Goodale in estimating the value of reserves, gives the following cost of mining in 1894 and 1895:

	Mining and Hauling.	Concentrating.
Silver Bow	$3.78	.55
Gray Rock	5.12	.55
Blue Jay	7.22	.55
Smelting charges	4.47	...

COLORADO.

Republican: At Cripple Creek since the final decision in the Enterprise Rico-Aspen case was rendered by the Supreme Court there has been nothing to precipitate any new litigation between the tunnel drivers and surface workers, but there are evidences that the opportunities for contest that have been presented in advance of the decision are being followed up by the parties interested and suits prepared for the courts.

Both railroads entering the district have notified the mines that they will receive no more ore for the valley mills until further notice. Their cars are all loaded, the side tracks are full, and the mills seem unable to take any more ore.

The Victor mine is down to thirty tons of ore a day, and cannot produce less unless all development work is stopped. The ore body in the ninth level is said to be much greater than that in the eighth.

The present capacity of the process plants is 450 tons a day, made up by the Metallic Extraction, the El Paso at Gillett, the Brodie and the Colorado City. The new mills going up are the El Paso at Florence and the Turner at Arequa, with the page at Florence to be restarted. These, with eighty tons additional to be given the Colorado City and 180 increase at the Metallic Extraction raises the total capacity to 1015 tons daily, when all the plants and enlargements are running to their full capacity.

A vein of ore identical to the Tom Boy has been opened up on the North Chicago and the owners are confident that they have the extension, while the Tom Boy people are positive that it runs on the Mono, or they would not have purchased it and the Lake Views last spring for a big consideration. The matter, however, will be determined in the near future.

A Hartford, Conn., company has almost completed a modern chlorination plant in Boulder, with capacity for the daily treatment of fifty tons, erected for the special treatment of ores from Magnolia. The same company has purchased and is now operating three properties at Magnolia.

The El Paso-Gold King in Poverty gulch has started a new sinker pump and with it is holding the water level and is able to resume sinking the shaft. The shaft is now 485 feet deep and at the 500-foot point it is proposed to cut a station and put in a permanent pump.

At Idaho Springs the Stanley mine has been under development for four years, and now 400 men could be advantageously placed at mining the ores in sight. As development proceeds the stulls and chutes for ore are placed in position ready for breaking down. But it is proposed to sink the shaft 1000 feet before beginning to mine, and at that depth the levels, as driven into the hills, will have gained a depth of about 2000 feet, opening out the lode for about a mile in length. Some of the levels have now been run into the hills for 3000 feet, and others are going into them as fast as men and air drills can do it. The company is shipping from ten to twelve carloads of ore to the smelters each month, and treating its low-grade ores at the Salisbury mill.

At Central City in the Wautauga mine in Russell gulch, operated by the Calumet Gold Mining and Milling Company, extensive operations have been carried on for the past month, which are now finished and give this mine one of the best equipped plants in that section.

The Robert Emmett mine in Chase gulch is to be equipped with a first-class plant of machinery within the next week, and a larger shaft house will be built.

At Aspen the ore body in the Argentum-Juniata has been driven into on the sixth level for a distance of 37 feet, and the drift is still in ore. Developments on the seventh level show the ore body to be richer than on the sixth.

Aspen *Tribune*: The extent of the rich strike in the Mollie Gibson, made last week, has now been determined, and it appears to be one of those rich pockets so characteristic of that portion of the property. The lease still shows a considerable quantity of 1000-ounce ore, but it is now conceded that the strike is not in the nature of a chute or a large ore body.

Telluride *Journal*: Ten stamps of the Telluride Power Transmission Company's 120-stamp mill on Bear creek started to work last week on a lot of quartz recently extracted from the Canton mine.

In the Smuggler-Union heavy development work in the mines is progressing and the seventh tunnel level is now pretty well blocked out, opening up large areas of ore, and the deep tunnel level is 600 feet north of the Union shaft and going ahead. The property was never in better condition for a large production than at present.

Telegraph: At Cripple Creek for the week ending May 29 the Elkton Consolidated Company shipped a total of twelve cars of ore. Of this number two contained high grade, two second, and eight third grade.

The Union Company shipped six broad-gauge cars of ore during the week, evenly divided between the mills and the smelters.

Shipments from the Moon-Anchor mine for this week, 100 tons of mill ore, 45 tons of smelting ore and one consignment of very high-grade ore.

The lessees who are developing the Monument, a Battle Mountain property owned in this city, shipped three cars of ore this week.

ALABAMA.

The mineral production of the State of Alabama during the month of April, 1897, as ascertained from the report made by the several producers, is as follows: Coal, 382,462 tons; coke, 108,015 tons; pig iron, 81,824 tons; iron ore, 243,808 tons; limestone and dolomite, for flux, 20,200 tons; building stone, 12,000 cubic feet; bauxite, 879 long tons; number of employes engaged in mineral industries, 13,500.

LOWER CALIFORNIA.

Lower Californian: Work on the Providencia, a prospect in the Jacalitos district recently purchased by F. M. Bradshaw et al., is progressing rapidly. A large force of men are busy grading roads and a three-compartment shaft is being sunk on the ledge, which is described as a very extensive body of high-grade ore.

The mill on the Piedad mine, which has been leased by Mr. Bradshaw, closed its run this week on ore from the Angulo mines in Burro canyon, in which T. A. Ripperdan and San Diego parties were interested. This mill will be used in developing the Providencia mine.

NEW MEXICO.

(Special Correspondence).—In Hell canyon, twenty miles southeast of Albuquerque, the most noted mine is the Millagors, owned and operated by Pueblo parties. The general run of its ore samples about $16 per ton. The property has a mill, which operates on the roll and crusher plan, with copper plates, but it is reported that it is being overhauled for the purpose of making changes.

The Bellevue and the Folsom, in the same locality, have large ore bodies which are, in the main, low-grade. A company is being organized on the Bellevue, with the object in view of building a mill. This company is being promoted by Messrs. Fitchett, MacMas-

ter and Propper, the last-named being a resident of Albuquerque.

The Star mine, also in Hell canyon, has been a producer of gold, but is now closed down. The ores are oxidized iron, which run into copper at greater depth. The property belongs to H. T. McKinney, of Hell canyon.

The Little Pittsburgh, owned by a company of that name, is in the same locality. Its shaft is down about 120 feet, in the course of which several streaks of high-grade ore were encountered. The full ledge of ore runs about $14 in gold. The property is not now working on account of surplus water.

The Gray Eagle has a large body of ore, averaging $12 per ton, and the work is as yet close to the surface.

The Cochiti mining district is fifty miles from Albuquerque and twenty-five miles west from Thornton station, on the Santa Fe railroad. The ores in this district are gray sulphurets, and run very high-grade in silver near the surface. At greater depth the silver values decrease and those of gold increase. The workings as yet are shallow, the greatest depths being only about 100 feet. The ores are best adapted to the smelter. Among the properties which ship ore from Cochiti district are the Washington, Crown Point, Lone Star, Albemarl and Black Girl. One concentrating mill in the district is operating and another is to be built at Allerton, six miles east of Bland, which latter is the main town of the district.

The San Pedro district is forty miles east of Albuquerque and is, in the main, a gold-producing camp, a considerable proportion of the ore being free milling. Three or four mills are operating there. The large smelter, built there several years ago by the Santa Fe Copper Company, has not been running for about five years. The closing down of these works is said to have been the result of differences among the members of the company, and not by reason of any difficulty in treating the ore profitably or obtaining a supply of ore.

The ores which do not amalgamate are shipped to Pueblo smelters. Besides carrying gold, the ores of San Pedro district carry lead in form of galena and copper in the form of pyrites.

The Lincoln Lucky, which has been a considerable producer, has been inactive for some time, pending litigation with owners of adjoining property.

The Gold Standard produces, in the main, a free-milling ore, and its supply of ore keeps the two mills in San Pedro operating.

The C. C. Company, same district, has lately put in a 25 H. P. gasoline hoist. A shaft is being sunk to connect with a tunnel which is in 200 feet. The ores from this property run $60 per ton in gold, silver and lead.

At Magdalena the Graphic Mining and Smelting Company's lead smelter is running at full capacity, which is 100 tons of ore per day, and they ship three cars of bullion per week. The smelter is run principally on ores from the company's own mines. The ores are both galena and carbonate of lead.

The Kelly mine, near Magdalena, produces the same grade of ore as that described above, which is shipped to El Paso smelters. There are other mines, west of the Magdalena mountains, where 2-stamp mills are operated on free-milling ore. This is in Water canyon, and a company is being organized in the East to build a smelter there. WASCOTT.

Albuquerque, N. M., May, '97.

ARIZONA.

(Special Correspondence).—The many shipments of mining and milling machinery into every mining district of the Territory of Arizona may be cited as an excellent confirmation of the reports which come from the camps everywhere of new strikes and rich developments. Prescott is the supply center for the various mining regions of central Arizona, included in which are the Rio Verde country, Black Hills, Chaparral, Big Bug, Bradshaw, Congress, Stanton, Crowned King, Harqua Hala, as well as Lynx Creek and other nearer points. All these districts are more or less connected, forming a mineral belt from Jerome to Harqua Hala. The ores carry gold, silver and copper, as a general proposition. Some of them—such, for instance, as the United Verde—are chiefly copper, with light values in gold and silver; while others—such as the McCabe or Henrietta—are known as gold properties, with some values in silver and copper.

The Chaparral district, about twenty miles southeast from Prescott, is one of more than ordinary promise, because it embodies the groundwork for a great many mines. At present it comprises the Chaparral district proper and the Big Bug region, two to four miles southward. The hills and mountain spurs in this section are smooth and easily traversed, and contain a growth of scrubby-oak timber, which serves a good purpose at the mines, mills and camps. Still farther southward, on the mesas of the Bradshaw mountains, are belts of heavy timber. The water supply, especially at this season of the year, is abundant from small mountain streams and springs, while most of the mines furnish more water than is required for ordinary purposes.

In Chaparral proper are the McCabe mine and mill and the Little Jessie mine and mill, while in Big Bug gulch are the Providence group, the Henrietta and the Lottie, each of which is equipped with its own mill.

The McCabe has just put in a new 80 H. P. boiler, which was fired up on the 10th inst. In this property the main shaft is down 470 feet and the entire workings consist of about 2500 feet of shafts and winzes and 7000 feet of drifts. The production is that which results from carying out the general plan of development. A 10-stamp mill is in operation. The ore milled runs in value from $35 to $40 per ton. That shipped directly to the Pueblo smelters is higher grade, running from $60 to $100 per ton. For the first 150 feet in depth the ores were oxidized and quite free milling, but at present depth they become more refractory, and the milling process becomes largely one of concentration. The vein is vertical, the walls well defined, the vein matter being from 2 to 22 feet wide. The property output is paying for all improvements and developments and some dividends besides. Forty men are employed.

The little Jessie, located about two miles west of the McCabe, is in a good state of development and has a 20-stamp mill, only ten of which are now dropping. The ores of the Jessie are of a siliceous nature, carrying gold, silver and practically no copper. In this mill part of the values are saved on the amalgam plates and the remainder in the concentrates. The depth of the main shaft is about 700 feet, with 500 feet of drifting at second level and 600 at first. The output is about twenty to thirty tons per day, the values running from $40 to $200 per ton. This property is being worked under the direction of a receiver and it is believed it is being put in good condition.

The Henrietta mine and mill are operating steadily and have for some time made an excellent record. The ore is handled through a main tunnel, 1300 feet long, which intersects a shaft at 900 feet from the mouth. The depth of the shaft is 428 feet. The Henrietta vein is almost vertical, from 16 to 18 feet between walls, with a pay streak well defined and continuous. As is characteristic of the district, the ores are a sulphide. The mill has twenty stamps, ten of which are running, and six vanners. About half the values are saved on the plates and half in the concentrates. From seventeen to twenty tons of ore are milled daily. The values range about $30 per ton in gold, silver and copper. The copper and silver product is said to be sufficient to pay for the shipment of the concentrates.

The Providence group consists of the Anna mine and mill, the U. S. Treasury and the Eugenia. The new 10-stamp, rapid-drop mill, with three 6-foot vanners, is an up-to-date, well-regulated property, and, like other mills mentioned, its work is that of concentration and amalgamation. The ores from the Anna are sulphides, heavy in copper and gold. While they were considerably oxidized near the surface, as greater depth is attained there are greater values in copper and gold, and they become more of a concentration proposition. The work of the company is largely one of development, and their plans contemplate making a big property. The shaft is down 230 feet, with 400 feet of drifting therefrom. About thirty tons per day are being handled. The ore is rated high grade, the concentrates being shipped to El Paso smelters. The Providence Company's U. S. Treasury property comprises sixteen claims, on which a tunnel is being driven to cut three veins on the property. The Eugenia tunnel, now in 180 feet, is being retimbered. The ores from this property are rather base and lower grade than those of the Anna. This company contemplate erecting a smelter on the ground to treat their ores.

The Lottie group, located in the upper end of the Big Bug gulch, has a 10-stamp mill, with Triumph concentrators, and the proprietors are putting in a new 60-horse power boiler. The main workings in this property are from a 500-foot tunnel, from which there are 1200 feet of drifts and a 320-foot shaft. About twenty tons of ore per day are being milled. No attempt is made at amalgamation, all the savings being in the concentrates.

On the Boggs copper property, in the lower end of the district, there are some developments, consisting of an 80-foot shaft, 80 feet of drifts and stopes, all said to be in ore which averages 15 per cent in copper. It is claimed this is an extensive lead, the ore being very much oxidized.

The Poland group, in the upper end of the Big Bug district, has some very extensive development, and it is claimed there are 24,000 tons of ore blocked out, while no milling facilities are as yet provided. The ores are said to be high grade.

Lynx Creek district, located about fourteen miles from Prescott, comprises some properties which are in a fair state of development. Among these are the Fortune group, consisting of fourteen claims, on each of which are some positive developments. A 10-stamp mill is running, with plates and concentrators. On the plates from $15 to $25 per ton is saved and $60 to $75 in concentrates.

In the Bradshaw mountains, some forty-five to fifty miles south of Prescott, is the well-known Crowned King mine, which was for many years listed in the category of prospects, but which for the past five years has paid a dividend approximating $10,000 per month, with a 10-stamp mill. The ore is gold, copper and zinc. About $12 to $14 per ton is saved on the amalgam plates and the rest in concentrates.

Results of developments on the Monte Christo, six miles southeast of Prescott, are very reassuring and the property will doubtless become a good mine. A tunnel has been driven 250 feet on a ledge containing solid ore 2 feet thick, rich in wire gold and wire silver, shipments from which are said to have run $200 per ton.

The Chicago Gold Mining & Reduction Company is erecting a mill at its property on Cherry creek, east of Prescott. The mill will contain crushers and vanners. There is said to be a good showing of ore on this property.

With the application of additional capital and energy to the development of the great mineral belt known to extend through the section partially described, each district will become the center of a mining industry of an extensive and most substantial character.

Prescott, Ariz., April, 1897. WASCOTT.

(Special Correspondence).—In the Sirerrita mountains, in Pima county, 28 miles southwest of Tucson, are the eleven claims of the Baxter group, which are producing a good grade of copper in the course of development.

The Silver Hill district, which is 60 miles southwest of Tucson, in the Sirerrita region, is the center of some positive development, and a few miles to the south of it is the Arivacca district, which, as a prospecting region, is promising. The ores carry gold and silver. Jos. Danker has erected a custom mill here.

At Oro Blanco, nine miles southeast of Arivacca, is the Old Glory mine, which was worked for some time, but has closed down by reason of an insufficient water supply. The Oro Mining Company is operating a 10-stamp mill in this section.

The Harsha mining district, eleven miles east of Crittenden, has developed to the extent of becoming a shipper of ore.

South of Harsha, near the international line, is the Patigonia district, where the Duquesne Mining Company is operating, and which is working six or eight claims, which yield copper ores. W. A. Clark, of the United Verde, has some interests in this district.

The Washington camp, 20 miles east of Crittenden, is becoming a producing camp of importance, the ores being primarily copper. A smelter is being erected at that point.

The Omego & Columbia copper camp has several mines working.

At Rosemont the smelter is employing 75 men.

An effort is being made by W. M. Jacobs and associates, of Tucson, to develop the rich placers in Horseshoe Basin, 90 miles west of Tucson. It is claimed the gravel and sand of a large area there runs on an average 40c. to 60c. per cubic yard in gold. It is proposed to purchase the old Cornish pump which was put in at the Quijotoa mines several years ago and divert its five miles of pipe line to the gravel beds of Horseshoe Basin. WASCOTT.

Tucson, May, '97.

WHITE HILLS DISTRICT.

There is every prospect that the White Hills country will become an extensive field of operations for gold and silver mining. The district has been undergoing developments and prospecting since 1892, a considerable portion of which has been the work of leasers. Up to the date of this writing, May 1st, some forty or fifty leasers have been almost constantly at work, and some of them have made snug little fortunes. But within the past few months practically the prospected and partially developed grounds in this vicinity have been purchased by and are now under the control of the Excelsior Mining and Milling Company and the subordinate companies connected with it; and as the company contemplates working all its claims directly, the leases have all been terminated, or not renewed, leaving the lessees either to seek employment with the company or go to other fields.

Retracing a little, I will say that the locality known as the White Hills is in Mojave county, fifty miles north of Kingman, and is reached by a stage line from the latter place. Going from Kingman to the White Hills the traveler goes through the Sacramento valley for a distance of about forty miles—a valley ten to twenty miles wide and of superb beauty; and well grown over with bunch grass, sagebrush and various plants. The name "White Hills," is not a misnomer, for the hills when seen in the distance have an ashen whiteness.

About thirty-five miles further northward is the great bend of the Colorado river, at which point, known as Temple Bar, a large hydraulic mining plant is being put in by the Temple Bar Consolidated Mining Company. Piers are being erected in the river, from which a boom will be put in to catch driftwood. Between White Hills and Temple Bar are several basins, on the outskirts of which some effective prospecting has been done.

The town of White Hills is built on an entirely smooth surface, at the foot of the hills, and contains possibly 400 persons. Like many similar localities the progress and growth has been largely a question of water. Thus far, the water for domestic use has been hauled from springs seven miles to the west. The water for steam use and milling purposes has been supplied from the veins of the mines. However, the Excelsior and White Hills Mining Companies are to put in a water system by which water will be piped from the springs some distance away to the mills, mines and town.

The mining operations now in progress are from five different shafts and inclines, which vary in depth from 250 to 500 feet. About 250 men are being employed at the different mines and at the 10-stamp mill now in operation in the northern part of the district. In the south end of the district, where the larger mines are located, the company is building a new mill of 40 stamps, twenty-four amalgamating pans, twelve settlers, two 120-horse power engines, four crushers, automatic feeders and a good sized dynamo.

From the character of the mills the reader will see that the ores from the White Hills are free milling and that concentration is not a part of the process at present. The ores are in chlorides, the base being iron, and the amalgam produced has its chief value in silver, though the gold is an important item. Those ores have run as high as 600 or 800 ounces in silver, but a safe generalization places the values from $50 to $100 to the ton of ore.

While the producing mines of the White Hills are confined at present to a comparatively small area, there is no reason to assume that the actual mineral belt is thus limited.

On the way to White Hills from Kingman, but a few miles off the main road, are the rather important camps of Chloride, Mineral Park and Cerbat, wherein work in several mines is going on. Ores from the three camps named are hauled largely to Kingman and sold to the sampling company at that place, which ships, in the main, to Pueblo.

Kingman is the outfitting point for the camps named, as well as others along the Colorado river, and is the initial point from which a railroad may be built to take in White Hills and other mining camps between Kingman and the Colorado river bend.

White Hills, Ariz., May 1, '97.

WASCOTT.

Scientific Progress.

The Synchronograph.

In a paper before the American Institute of Electrical Engineers, on the synchronograph, A. C. Creehore and G. O. Squier say:

It is of interest to inquire what effects a system of telegraphy capable of sending continuously 3,000 words a minute would have on the existing methods. To take a single example of the business between New York and Chicago, where about 40,000 letters are carried daily, it would require but two lines in continuous operation to handle the entire business. At present it takes three days to receive by mail a business reply between New York and Chicago. This transmission by machine telegraphy could be accomplished easily the same day.

Among the possibilities is the simultaneous publication of the same newspaper in different parts of the country. For example, in an edition of a daily paper having twelve pages and eight columns per page, making ninety-six columns in all, there are less than 185,000 words. At the rate of 3,000 words per minute it would only require about an hour to transmit the entire contents of the paper. This calculation furthermore assumes that the whole paper is uniformly printed in fine type. It would require a single operator, working by hand and averaging twenty words per minute, over six days of twenty-four hours each to send this amount.

The system proposed is especially adapted to meet the demands of this class of business; for the great flexibility of the alternating current, as employed, permits if necessary considerable amounts of power to be transmitted over the line which may be used for making simultaneous manifold copies of the same dispatches in each of widely separated cities. In this manner each of the several newspaper company subscribers in each city receives the identical service with the minimum delay, since each copy received is an original. Each additional subscriber to this service represents no appreciable expense to the company, since it requires but another receiving needle. Furthermore, the use of the alternating current permits the line to be used quadruplex at very rapid speeds, that is, four entirely different dispatches may be sent over one wire at the same time, two in each direction, and any number of copies of one or all the dispatches may be received independently at the same time.

It is thought that a telegraph company of the future will fulfill a somewhat different function from the present ones. The company will own its wires and rights of way as now, but the tendency of the offices proper will be to transmit and receive letters already prepared rather than to undertake the preparation of the letters as well. The income of the company will be derived from the rent of its lines at a fixed price per minute, or a fixed price per hundred words. The service of the telegraph office then becomes like that of the post office, its duty being to receive and deliver letters already prepared, as the post office does. The difference between the two offices is in the manner in which this is accomplished. The telegraph office becomes a post office which employs an electric current in a copper wire to carry its letters instead of a railroad train. The advantages in point of speed of delivering letters by the former method are apparent. Instead of requiring twenty-four hours to deliver letters between New York and Chicago, it will require but a few hours at most, and make it possible to receive a reply the same day. It is probable that such a system would take more business from the present postal system than any other; for when telegraph letters can be sent at reasonable rates comparable with postage, in a few hours instead of many days, a certain amount of present post office business will be diverted. More than this, when business can be done with greater

facility than at present, the total volume of business will undoubtedly be increased, because transactions may take place in a day which formerly required a week.

It is understood that these telegraph letters are sent by mail in envelopes in the usual manner, except that the envelope contains the prepared message ready to be sent through the transmitter, and thus the telegraph office becomes relieved of the preparation of the letters which is not strictly a part of its business. When the system comes into general use, business offices will have their own perforators, and it will become necessary for the operator to learn the telegraph alphabet as a part of his preparation as a stenographer and typewriter. The three-key perforating machine is comparatively inexpensive, but undoubtedly a machine could be devised at an early date, as an attachment to the present typewriter, for the purpose of perforating letters at the same time that they are being written by the typewriter in the usual way. This could be constructed to operate by the use of electro-magnets, and can be attached to a typewriter without interfering in any way with its operation.

The telegraph line of the future will comprise substantial poles carrying a few copper wires worked to their full capacity for transmitting electric signals. The cost of maintenance of such a line when once constructed will be little more than for an ordinary iron wire now used, while its carrying capacity for intelligence at 3,000 words per minute simplex will be about equal to 160 wires used for hand transmission simplex. By duplexing the line, the carrying capacity is doubled and becomes 6,000 words per minute, which is about equal to 160 wires worked duplex, or to 80 wires worked by hand quadruplex.

An Aztec Manuscript Found in Iowa.

The archæological museum at the Ohio State University has become possessed of an Aztec manuscript—the fifth so far known to be in existence in the entire world, and the only one now in America, the others all being in European museums. J. T. Griffith, a laboring man, of Fairfield, Iowa, while engaged in excavating, brought to light what was apparently an ordinary chunk of wood, except that its surface was encrusted with a coating of pitch. The object was found about 3 feet below the surface, the dimensions being 1 foot in length by 8 inches in width, and 5 or 6 inches in thickness. A stroke with the pick caused it to break open, revealing a space that had been scooped out of the center, in which lay a roll of birch bark, covered on one side with strange looking hieroglyphics. The bark is of extreme thinness, and is of the character which was ordinarily employed by the Aztecs in their writings. The hieroglyphics are made with red pigment, and remain fresh and distinct. The natural color of the bark is also well preserved. The three pieces into which the manuscript is divided are from 3 to 4 inches long and from 2 to 3 inches wide. The edges are broken in two or three places, impairing a portion of the writing.

The wooden case in which the manuscript was inclosed is in a fair state of preservation. It is of hickory and the inside is charred. It had been rudely fashioned with a stone ax. But for its coating of pitch it must long since have gone to decay and its precious contents with it. Accompanying the relic were two photographs of the spot on which it was found. The scene is an open prairie, evidently the extreme suburbs of the little city. All doubt is set at rest as to the character of the relic. Its Aztec origin was speedily determined by Prof. Moorehead, whose extensive researches in archæology in connection with the Smithsonian Institute, at Washington, D. C., make him familiar with the signs employed by this race in their writings. Many interesting questions are aroused at sight of this fragmentary reminder of an extinct people.

Electrical Progress.

Electricity Displacing the Locomotive.

The New York, New Haven and Hartford Railway directorate has made another advance in the application of electricity in the operation of its road, the steam locomotive, the successful operation of this line from the point of view both of electrical efficiency and financial economy tends towards hastening the time when steam locomotives will eventually be relegated to the obsolescence of half-remembered though faithful servants.

This section is the longest section of any railroad in the world, hitherto exclusively operated by steam locomotives, to be equipped for electric traction. The total distance is 12.3 miles.

This system differs in its electrical equipment from that at Nantasket in that the trolley system of contact is not used. That adopted is the third rail system, the conductor or third rail being laid along the center of the track between the running rails.

The boilers are tubular, ten in number, each of 300 H. P., set in two batteries of five each. In the construction of the boiler-front a new method, devised by Col. N. H. Heft, chief of the electrical department of the Consolidated road, who has carried out the entire electrical installation, is followed. The entire boiler front is capable of being taken down without disturbing the rest of the boiler setting, the front being bolted to a plate attached to the dividing wall, instead of to the wall itself



SWITCHBOARD.



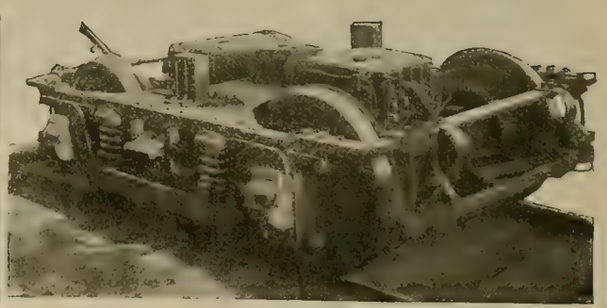
VIEW OF BOILER ROOM.



TRAIN, ONE MOTOR CAR AND ONE PASSENGER COACH.



850 KILOWATT DYNAMO DIRECT CONNECTED TO 1200 H. P. ENGINE.



TRUCK OF MOTOR CAR WITH TWO G. E. 2000 MOTORS.

in the electrical equipment of its line running from Berlin to New Britain and to Hartford.

The first electric car was run over the electric-equipped track on the 11th ult. Unlike the experiments at Nantasket and East Weymouth, this length of the newly equipped lines gives it an appearance of permanence, which removes it from the region of new experiments, and, while it is still difficult to predict with any assurance of immediate realization the supersession of

There are two feed water pumps, either pump being capable of supplying water to both batteries at once. The piping from the boilers is in duplicate and will be covered with non-conductive covering. The flues enter a brick stack 125 feet high, located immediately in the rear of the center of the present building.

The projected extension of the building will hold three more, and as each engine will have a capacity of 1200 H. P. the total capacity of the station

when completed will be 7200 H. P. nominal, which can readily be raised to 12,000 H. P. The engine at present in position is a Greene-Corliss improved cross-compound, condensing, rated at 1200 H. P. nominal, with dimensions 28x48x48, 4-foot stroke, running at 100 revolutions per minute.

To the engines is directly connected a General Electric Co. standard 10-pole 850-kilowatt generator of the iron-clad type, with the method of construction of which our readers are familiar. The dynamos are over-compounded and furnish current at 600 volts, no load, and 650 volts, full load. The switchboard in the bay is of the General Electric standard panel type, built up of seven panels, four of which are at present blank. Of the three equipped, two are generating panels, while the third is a totalizing panel. The first two carry automatic circuit breakers, with magnetic blowout, ammeter and the usual generator panel equipment. The totalizing panel carries a form G Thomson recording wattmeter, showing the total output from the generators. A traveler with two cranes—one of 35 tons, the other of 5 tons capacity—runs the length of the engine room. From the switchboard run four cables, each of 850,000 circular mils, cross-section to the third rail.

The top of the third rail is about 1 inch higher than the level of the tops of the running rails. The conductors are bonded, not by the ordinary leaf or stranded copper bond, but by plates of sheet copper ¼-inch thick, 12 inches long and 4½ inches wide. These are fastened to the underside of the third rail joints by means of a drop-forged iron angle-plate bolted by sixteen bolts, eight for each copper plate, on each side of the third rail joint, the nuts being outside the rail. Each bond has a capacity of about 900,000 circular mils, the total bond at each joint having about twice the carrying capacity of the rail itself, while its measured resistance is less than equal length of the 93-pound third rail. One of the most striking facts in this installation is the absence of feeders, entire dependence being placed on the carrying capacity of the well-bonded rail.

On the Berlin branch are four grade crossings. On the New Britain and Hartford line eighteen. At all of these crossings the third rail is omitted, the circuit being continued underground by stranded bare copper cables of 500,000 circular mils, and, in some cases, 850,000 circular mils. These cables are first drawn into creosoted wooden conduits filled with an insulating material made of residuum and asphalt. They are then laid in creosoted wooden troughs in turn filled with the same compound and then boxed over and buried. The broken ends of the third rail are fitted with wooden inclines, or approach blocks, to allow the shoe to rise upon the rail without danger of catching and breaking.

The motor equipment will consist at first of five motor cars. These are open cars 50 feet in length used last season at Nantasket, but deprived of the trolley. Each car weighs about 32 tons. Each is equipped with two G. E. 2000 motors and two "L" series parallel controllers. The car cut-out is a K. automatic circuit breaker fixed beneath the hood. Each motor car is fitted with air brakes, two gongs and a chime whistle.

Air for the brakes and whistle is furnished by a vertical double-cylinder air pump driven by a motor automatically controlled by special switch which is opened when the pressure in the main tank reaches 90 pounds and closed when it falls below that.

Contact is made with the third rail by means of sliding shoes. These are of cast iron 12 inches long and 4 inches wide weighing about 20 pounds. They are suspended by two links from a casting fastened to a beam set immediately beneath the king pin of each truck, connection between motor and shoes being made by flexible cables. The distance between the two shoes is about 33 feet.

Many of the grade crossings are wider than this; and, to avoid carrying the train over the crossing by momentum, another shoe is fitted to each truck of the second car of the train, a connection running from this shoe to the motors. Thus, by the time the last shoe has left the third rail at one end, the first shoe is in contact with the next section of the rail.

Credit for this installation must be awarded to President Clark for the courageous advance he has made in the application of electricity to travel on the steam line, to Col. N. H. Heft, the practical chief of the Electrical Department, who laid out and supervised the installations at Nantasket, East Weymouth and Berlin, and to the General Electric Company, whose long experience and perfected apparatus rendered the installation possible.

Mechanical Progress.

The Limitations of Government in Water-Power Plants.

By MARK A. REPLOGLE, Engineer.

The regulation of the speed of a water-wheel in a power plant is determined by four distinct factors:

1. Changes in load or requirements for power.
2. Time required for gravity to generate power.
3. Capacity of the plant for stored energy; and,
4. The governor or mechanism that should automatically combine the above three factors in such a manner as to obtain even speed or good regulation.

These factors, clearly defined, are bases from which intelligent calculations can be made showing the possible efficiency of government in any water-power plant.

Let it be understood that the word "government" refers to that regularity of motion or speed that is so desirable and necessary in our finest manufacturing and electrical power plants. Absolutely uniform speed can be maintained only when there is no change in the power supply and no change in the friction or work of the plant; but if the above factors are carefully considered and judiciously manipulated or applied, the variations of speed may be so reduced that the results can be called perfect government.

The speed of a plant at all times is a resultant of opposing forces establishing an equilibrium or balance. The power supply has a tendency to increase speed and the work has a tendency to decrease it. Speed may be varied by increasing the power supply or by decreasing the power supply; by increasing the amount of work performed, or by decreasing the amount of work performed; and any one of the above changes causes instantly a change in the speed; but the amount of change in speed depends entirely upon the amount of change in load, the time it takes gravity to generate power, the quantity of energy in store, and the operation of the governor in opening or closing gate.

Since it is impossible for any automatic governor to change the power supply at the instant a change has been made in the load or work of a power plant, it is very plain that there must be fluctuations in the speed. The problem of government is to narrow these fluctuations to such an extent that the speed will be constant as far as practical operation is concerned. The finest government ever obtained consisted of changes in speed, but within narrow limits. The speed of a well governed single-crank engine changes four times every revolution.

The first factor in governing, "the changes in load," is a variable one, and is limited only by the character of the work done by the water wheel. The changes may range from zero to the full power of the wheel instantly, making government a more difficult problem than it would be if the changes were limited in number or quantity. It is plain that if an even speed is retained when a change in load is made, there must be at the same instant a corresponding change in the power supply. This is an impossibility in automatic governing, for several reasons: the speed must change in order to inspire the speed governor; following this, the speed governor causes the valve or gate-moving mechanism to operate, which operation requires time; and again, it requires time for gravity to overcome the inertia of the increased quantity of water that must pass through the wheel before an increase in power can be had. During all this time, the speed of plant has been decreasing if the load was increased, or increasing if the load was decreased, and the amount of change in speed depends entirely upon what ratio the change in load bears to the stored energy in the moving parts of the plant. A heavy change in load will of course cause a greater change in speed before the power supply is changed than a light change in load. The problem is, therefore, to proportion properly the power storage to the changes of load that must be imposed upon the plant, because this power storage, or the capacity to store power, must take care of all changes in load until the power supply, or gravity effects, can compensate for said changes.

The second factor, "time required for gravity to generate power," is more constant than the first. In fact, the limits are established in the construction of the water-power plant, and, of course, remain so. The point we wish to emphasize most in the time requirements is the inertia and momentum effects of the water.

A locomotive can propel a train of cars at a rapid speed; but it takes time to acquire such speed. When the locomotive has brought enough pressure to bear upon the train, it moves, at first slowly, but keeps increasing in speed often many seconds before it reaches full motion. The locomotive may be limited in strength to 250 H. P. per second. The train in full motion may represent 25,000 H. P. for a second. In such case, it will take the locomotive 100 seconds to bring the train to speed if we do not consider the frictional losses. Water has no power in itself; but must be put in motion by gravity in the same manner that the locomotive starts the train of cars, and a long train of water acted upon by a constant gravity effect, is put in motion in the same manner that the train of cars is by the locomotive. It is plain, then, that the time element must be considered in the government of water power. The water wheel cannot furnish power until it brings to rest the water to which the gravity has given motion, and it can receive no power from the water until the water has sufficient motion for the moving wheel to retard. It is also plain that there must be changes in the flow and velocity of water for every change made in the load of the water wheel; also the change in the flow of water must occur before there can be a change in the power supply.

It is well known that water has practically no elasticity; hence, if enclosed in a long pipe, the whole body must be put in motion at the same time. If the pipe or flume consists of several hundred feet of horizontal length and only a few feet of vertical pipe or "head" which alone gives gravity effects on the wheel, it is a similar proposition to the locomotive and train of cars. It is very evident, then, that long horizontal pipes should be avoided in order to reduce to a minimum the time required to get gravity effects, because the speed of water wheels will keep changing, after a change in load, until the effects from gravity can correct it in the power supply.

Gravity effects at best are very slow as compared with steam, and for this reason a water power is handicapped in the matter of government. The logical conclusion is, that in water powers the water or power supply should all be under the direct action of gravity and move in line with it. This reduces the time necessary to furnish increased or decreased power, to the shortest limit.

The Use of Compressed Air for Mining Purposes.

NUMBER IV.

A lecture delivered to the Engineering Students of the Leland Stanford Jr. University, May 3, 1897, by EDWARD A. RIX, M. Am. Soc. M. E.

As an instance of the relation of storage to intermittent work I will cite the case of the Banner mine, at Oroville, Cal., that has a compressor having a single double-acting 10½x12 air cylinder; the piston makes 300 feet per minute, and the machine is probably delivering 150 cubic feet of free air per minute. This size of machine is rated by builders as a two-drill compressor, yet it is driving two 3½-inch machines, one 3½, one 2¾, and on occasion a 2-inch also. The united requirements of these machines, should they be running at the same time, would be 285 cubic feet per minute—almost double the output of the compressor. The explanation lies in a very large and unusual reservoir capacity—in fact ten times larger than ordinarily employed with a compressor of that size. The wisdom and economy, however, of such large receiver capacity is apparent and this example should be followed, especially as receivers are very inexpensive.

As an example of the advantage of reservoir capacity with a hoist, I call attention to the hoist at the North Star mine, Grass Valley, which develops 80 to 90 H. P. when running, but calls on the compressor to exert but from 25 to 30 H. P. to maintain it. There are probably not five mines in the State with proper air reservoir capacity, and if it were possible to arrange contracts with the mine owners to yield up 50% of the saving effected by putting in proper pipes and receivers, more than one person could earn a comfortable income by making such changes in this State alone.

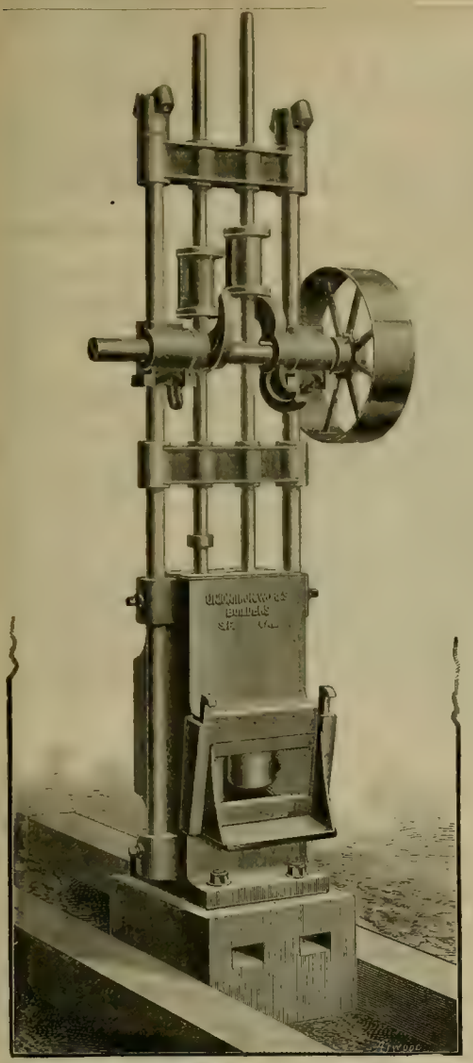
Receivers should be placed at any general distributing point in the mine, as well as upon the surface. Anyone managing a mine, by keeping a record for two days only, of the length of time his intermittent machines are running during the day, can readily calculate the proper receiver capacity required.

Coming now to the machinery proper, for the mine, first in order of installation is the hoisting works which we will consider only from the standpoint of economy and utility. It is supposed, of course, that the elements of strength, safety, capacity and everything, have all been properly considered by whomever was the designing engineer. It is almost a rule that a mine that can afford to have an economical transmission plant has use for a hoist of sufficient capacity to enable it to be one of the highest motor type, and for this purpose I should install a compound hoist, direct connected, that is to say, there will be no gearing whatever on the hoist, the shaft carrying the drums being at the same time the engine shaft. The cylinders are proportioned with reference to the initial and final pressures desired, and also with respect to the amount of expansion done by reheating. To get the largest amount of work from a hoist of this character the air should be reheated to about 400° before passing into the initial cylinder. It will be exhausted from there back into the second compartment of the compound reheater, and heated again to 400°; from there it will pass to the low pressure cylinder, perform its work and be exhausted to the atmospheric pressure.

It does not require any particular amount of calculation to show that with this double reheating the volume of the air may be practically increased from 60 to 80%, with a corresponding degree of economy.

For the second reheating there is practically no extra fuel required, the second reheater being placed above the first one and absorbing the heat after it has passed through the first series of tubes. The piping on a plant of this kind should be so arranged that either cylinder can take the high pressure air, for either cylinder exhausts it directly into the atmosphere, as well as the piping for the operation of compounding.

(To be Continued..)



PROSPECTING BATTERY.

UNION IRON WORKS,

222 Market Street, San Francisco, Cal.

THIS : :

Two-Stamp Self-Contained Battery

IS DESIGNED BY

THE UNION IRON WORKS

Expressly for Prospecting Work.

It was awarded First Prize at the recent Mechanics' and Manufacturers' Fair, where it was in daily operation, crushing ores from various mines throughout the State.

Weight of stamps, 275 pounds each; capacity of battery, determined by actual work, 200 pounds per hour, through a No. 7 slot-punched screen.

Entire battery weighs about 3000 pounds; heaviest piece, mortar, weighing 1200 pounds.

Can be taken apart and transported to any locality.

Electrical Engineering Co.,

34-36 MAIN STREET,

SAN FRANCISCO, CAL.

Manufacturers of All Kinds of

Electric Machinery

For Mines, Mills and Hoists.

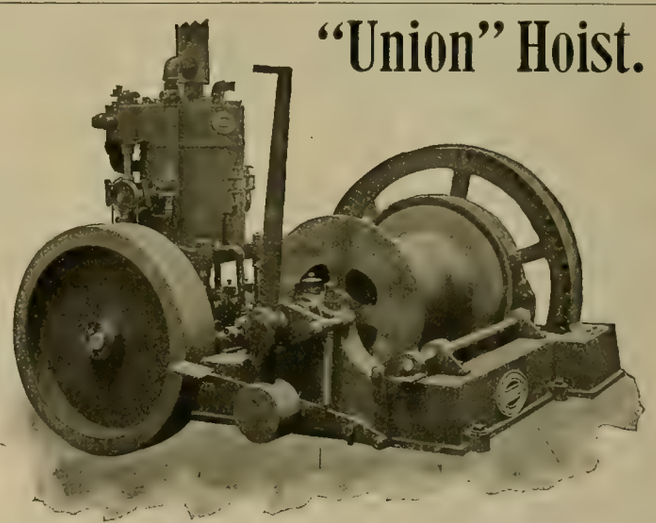
Girard Water Wheel Co.,

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These wheels are durable, highly efficient, and are the only wheels which have perfect regulation, which feature makes them especially suitable for the operation of electric machinery.

"Union" Hoist.



The above cut represents our 10 h. p. Double Cylinder Engine of latest type, and Hoist combined on strong iron base. This hoist is designed to raise one ton 125 feet per minute from an inclined shaft, or 1500 pounds at the same speed vertical lift. The drum will hold over 600 feet of ⅝-inch cable. The outfit weighs 3500 pounds.

THE UNION GAS ENGINE CO.

—BUILD THE—

"Union" Gas Engines,

Which use either Manufactured or Natural Gas, Ordinary Stove Gasoline (Naphtha or Benzine), Distillate or Kerosene.

STATIONARY ENGINES for All Kinds of Work, Built in Sizes from 3 to 200 h. p.
"UNION" COMBINED HOISTS in Sizes from 2 to 40 h. p.
"UNION" COMBINED COMPRESSORS—20, 30, 40 h. p.
HOISTS and COMPRESSORS Can Be Built in Larger Sizes to Order.
"UNION" MARINE ENGINES, 4 to 200 h. p., of Single, Double and Four-Cylinder Types.
TEN YEARS' EXPERIENCE Building Gas and Oil Engines.
"UNION" ENGINES Are In Use All Over the United States.
"UNION" ENGINES Are Simple, Durable and Economical.

Office: 314 HOWARD ST., SAN FRANCISCO, CAL.

Coast Industrial Notes.

—The San Joaquin Valley Road is now completed to Hanford, Cal.

—Williams, Arizona, is to have the largest creosote works west of the Rocky mountains.

—The California Wine Association has cut the price of California wine to 22 cents per gallon.

—A $75,000 steam tug is to be built at the Mare Island Navy Yard for the Port Orchard dry dock.

—The principal shops of the Atlantic & Pacific are to be removed to Los Angeles from Albuquerque.

—The track on the Sierra Railway has been laid to Maxwell, twenty-five miles east of Oakdale, Cal.

—The S. P. and U. P. roads have established closer commercial relations, and northern business over the S. P. will go via Sacramento.

—Colonel Suter will shortly let contracts for improvement work in Oakland harbor, for which the sundry civil bill carries appropriations of $680,000.

—A Stockton, Cal., harvester works is building a machine that will cut a swath 50 feet wide through a field of grain. It will be drawn by thirty horses.

—A concession recently granted by the Mexican Government to Jesse Grant and associates calls for the development of the different resources of Lower California.

—The Treasury Department announces that the supervising architect's office will be ready to advertise for bids for the construction of the San Francisco postoffice by the 15th inst.

—The orange shipments from Riverside, Cal., for the season aggregate 707,440 boxes. Nearly 100 carloads more will be shipped, bringing the season's total up to over 2500 carloads.

—A press dispatch announces that the Missouri River and Los Angeles Railway Company, capitalized at $420,000,000, was incorporated at Dakota City, Neb., last week. It plans to build a line from the Missouri river to the Pacific.

—A decision by the United States Land Commissioner at Los Angeles invalidates the title to the Morena reservoir site, wanted for a city water system for San Diego, and prevents the fulfillment of the $1,500,000 contract between the city and the water company.

—The San Francisco chemical works are adopting a new system in their manufacture of sulphuric acid. Instead of buying sulphur direct, they buy sulphurets from a mining company, by roasting expel the fumes, and thus secure the base for the manufacture of the acid.

—The bonds for the completion of the entire canal system of the Turlock Irrigation District have been sold and the work of construction will be pushed to completion. The district comprises 176,000 acres in Stanislaus and Merced counties. Eight hundred thousand dollars has already been expended on the canal and diverting dam.

—It is reported in Tacoma that the Blakeley Mill Company has awarded A. S. Kerry a contract to cut 180,000,000 feet of timber standing along the Stillaguamish river, in Snohomish and Skagit counties. About 20,000,000 feet will be cut annually. Eighty men are at work building a seven-mile logging railroad from Port Susan on the Sound into the heart of the timber.

—At Eureka, Cal., the Excelsior Redwood and Humboldt Logging Company wants the privilege of extending their railroad from Freshwater over the State tide lands to Woodley island, three and a half miles, where they will construct an 800-foot wharf, warehouses, booms, etc. The company is also contemplating the building of a modern redwood mill at Freshwater, the entire plant to be run by electricity.

—The new State Department of Highways has been organized, and will establish a system of State, county and district highways, exploring every part of the State for the best and economical supplies of road materials, keeping up the agitation for good roads, holding public meetings, publishing road information, advising road-builders everywhere, and getting ready a batch of road laws to risk on the next Legislature.

—The Auditing Board of the Commissioner of Public Works has agreed to authorize the engineers to have the Newton Shoals in the Sacramento river bored, to ascertain the nature of this menace to navigation, and they were also authorized to formulate and present at the next meeting, or as soon as possible, an estimate of the probable cost of the proposed work on the Sacramento and San Joaquin rivers, and to consult and act in conjunction with Captain C. Gillette.

—The plant of the Shasta Lumber Company which failed some time ago for nearly $1,000,000, has been sold under a trust deed to the San Jose Deposit Bank of Savings of $100,000 to the Friend & Terry Lumber Company. The property includes a broad-gauge railroad sixteen miles in length from Anderson, Shasta county, to the end of the company's flume; a flume thirty-two miles long, carrying 2500 miners' inches of water; a box factory and drying kilns at the dump end of the flume; a complete sawmill plant with a capacity of 10,000,000 feet of lumber a season, and 28,000 acres of Shasta county timber land, on which, it is claimed, are 500,000,000 feet of lumber in sight.

—Word comes from Hermosillo, Mexico, that the formal transfer of the Sonora railway to the Southern Pacific by the Santa Fe took place June 1. It is announced that substantial improvements will be made. It is also stated that Hugh Tudor Richards, formerly general manager of the Sonora railway and holder of a concession for orange lands, has procured an option on the Occidental railway of Sinaloa. Richards represents a syndicate whose intention is to complete the road to Durango and also make its port terminus in the harbor recently discovered by Colonel Wrotnosky, twenty miles south of Altata, at the new mouth of the Culiacan river.

—The discovery of one of the largest coal fields in the world is reported to the State Department by the United States consul at Carthagena, Colombia: "The fields are in the department of Bolivar, in Colombia, eight to twelve miles from the Bay of Cispati, and 48 miles from Carthagena. The coal is semi-anthracite and anthracite, and is good steam coal. The fields contain about 300,000,000 tons, and comprise about 215,000 acres."

—A Russian correspondent informs London *Machinery Markets* "that there is now a great opening for locomotives and wagons in Russia. He states that the Russian railways require 300 locomotives at once, and more than 1,000 wagons annually, and he suggests that a company should be formed with a capital of about 3,000,000 rubles to establish wagon and locomotive works near the newly discovered iron and coal mines in the south of the empire. Such a company, he estimates, might fairly expect to receive dividends of from 15 to 20 per cent."

—In a letter from James J. Hill to a Western senator on the remarkable increase in the export trade in flour to China and Japan, Mr. Hill stated that, of the last year's crop of wheat of the Pacific coast States, about 28,000,000 bushels or its equivalent in flour has gone across the Pacific to make bread for Asiatic consumers. This is about 20 per cent of the whole crop of that region and the effect of this new commercial movement has been to raise the price of wheat in California, Oregon and Washington materially. Of the gain of 20 to 25 cents per bushel in present prices over the lowest range in recent years, Mr. Hill attributes 15 to 18 cents to the withdrawal of the Pacific wheat from European markets. Mr. Hill errs, however, in allowing the inference to be drawn from his letter that the entire new movement of flour to Asiatic countries is to be attributed to the establishment of a line of Japanese steamers sailing from Seattle in connection with the Great Northern Railroad. The real fact is that these Japanese boats have thus far taken out only three cargoes, and that a large part of those cargoes consisted of flour coming over the Northern Pacific Railway to Seattle. Without the help of the Northern Pacific the steamers would not have been able to get cargoes. The new Japanese line is maintained in part by a subsidy from the Japanese Government. It has materially reduced the ocean freight rate, but a reduction of perhaps 10c a barrel on three cargoes of flour by no means accounts for the great Asiatic demand. That demand has been growing steadily for a number of years. But this comparatively new commercial movement seems destined in time to absorb the whole wheat surplus of the Pacific coast States, and to maintain a price for wheat in those States equal, at least, to that which prevails in Chicago and Duluth. The benefits to the agricultural communities and to the towns and cities of the Pacific coast will be very great. An addition of 10c to 20c per bushel in the selling price of wheat in that region means a large measure of prosperity to the whole community.

Commercial Paragraphs.

THE Colorado Iron Works are putting in a 20-stamp mill on the Lucky Boy, in the State of Idaho. They have shipped a 10-stamp mill to Mexico. They are supplying two slag cars for the Arkansas Valley smelter at Leadville, and one car to the United Verde Copper Company of Jerome, Arizona. They have recently equipped the Beam gold and silver process mill with a set of 14x27 Cazin rolls.

THE Fulton Engineering and Shipbuilding Works, 213 First street, San Francisco, are putting in a complete cyanide plant for the Montana Co., Ltd., Marysville, Montana, including six tanks, each 30 feet diameter, air compressor, conveying apparatus, etc. They are also delivering two underground hoists, complete, to the Alaska-Treadwell Co., one 10x12, the other 5x7, and furnishing a complete hoisting outfit to the Gold Blossom mine, Ophir district, Placer county, Cal.

Recent California Mining Incorporations.

Crawford G. M. Co., San Francisco; E. Painter, E. M. Adams, C. Bier, M. R. Philips, J. M. Downer; capital stock, $100,000—subscribed, $250.

Belle M. Co., San Francisco; W. C. and R. E. Murdoch, H. F. Emeric, T. W. Wells, G. Blake; capital stock, $1,000,000: subscribed, $150.

Giant G. M. Co., Oakland, Cal.; K. A. Hughson, A. H. Ackerman, W. G. Hawkett, G. L. Nusbaumer, N. K. Foster; capital stock, $100,000; subscribed, $50,000.

Personal.

THOMAS J. BARBOUR of this city went to Butte, Montana, last week.

SCHUYLER DURYEE of New York has been appointed manager of the Gold Creek mines in Nevada.

MARSDEN MANSON has been elected President of the new Department of Highways of California.

C. W. WATSON has been appointed manager of the Winnamuck mine at Bingham, Utah, by the new owners.

W. S. HUTCHINSON has been appointed manager of the American Development Mining Company's properties at Gibbonsville, Idaho.

ALEXANDER HILL, until recently manager of the Mountain Copper Company, in Shasta county, Cal., has gone to London on mining business.

GENERAL E. C. HUMPHREY of Denver and Frank H. Pettingell of Colorado Springs, Col., arrived in San Francisco last Tuesday and are staying at the Palace.

MARCO VAROZZA has been appointed by the Governor Lake Tahoe wagon road commissioner. The last legislature appropriated $10,000 to construct and maintain a road from Placerville to Lake Tahoe.

CHARLES S. HERZIG, mining engineer, formerly with the Anaconda Mining Company in Butte and lately with the Boston and Montana Company of Great Falls, Mont., left on May 31st to take a position as engineer for the Playa de Oro Mining Company at their mines in Ecuador, S. A.

Recently Declared Mining Dividends.

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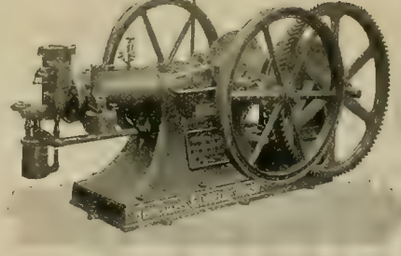
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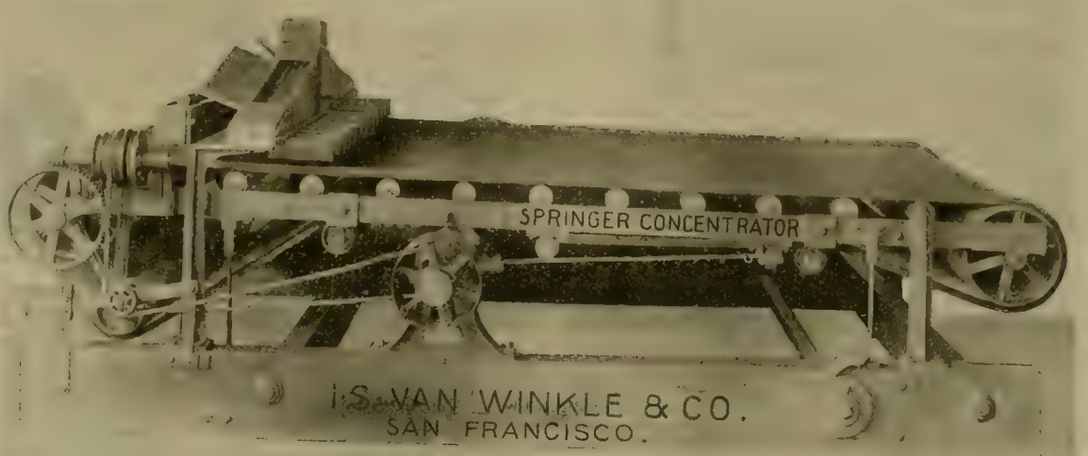
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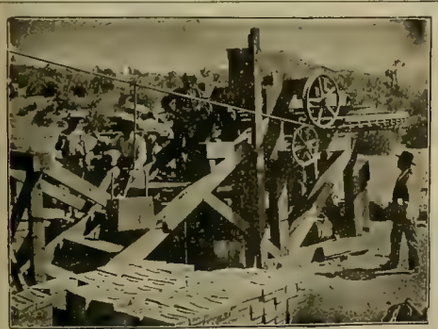
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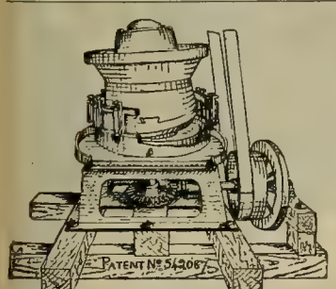
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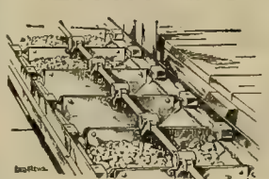
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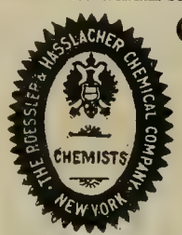
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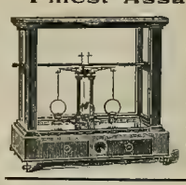


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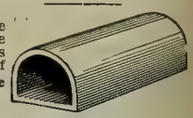


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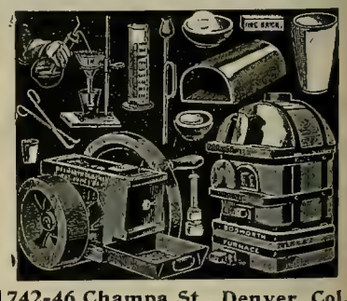


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List of U. S. Patents for Pacific Coast Inventors.

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FOR THE WEEK ENDING MAY 25, 1897.

583,354.—AMALGAMATOR—F. B. Austin, Tempe, A. T.
583,245.—LETTER-COPYING PRESS—M. P. Boss, San Francisco.
583,031.—CAN SUPPORT—F. G. Creeth, Los Angeles, Cal.
583,259.—CHECK BOOK—F. L. Dietz, Portland, Or.
583,142.—TELEPHONE—Duque & Cosgrove, San Francisco.
583,373.—GAS LIGATER—W. H. Fargo, San Francisco.
583,397.—HARROW—Hagstrom & Anderson, Chino, Cal.
583,114.—NETMAKING MACHINE—M. Jenson, Astoria, Or.
583,290.—DROP WEIGHT—W. L. Johnson, Pico Heights, Cal
583,329.—RUB IRON—G. Le Sage, Los Angeles, Cal.
583,235.—FOLDING GATE—J. T. McCormick, San Francisco.
583,400.—BOTTLE—E. B. Melchor, Los Angeles, Cal.
583,124.—BICYCLE WHEEL—F. A. Redmon, San Francisco.
583,126.—CARBURETOR—B. L. Ryder, San Jose, Cal
583,338.—SPEED INDICATOR—B. W. Scott, San Jose, Cal.
27,089.—SPOON DESIGN—C. G. Tingry, Portland, Or.

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Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FOLDING GATE.—John T. McCormick, San Francisco, Cal. No. 583,235. May 25, 1897. This invention relates to improvements in that class of gates which are designed to form a temporary lattice or open work closure for passages or hall-ways, windows, and for other like purposes. It consists in a means for making the gates more rigid and lighter than the ordinary constructions. The vertical bars are made angular in cross sections, having slots or channels formed in them and diagonally disposed connecting bars extend between these vertical bars, angular blocks fit the interior angles of the vertical bars, and by means of slots are slidable vertically therein, pins extending from the blocks through the slots and connecting the blocks with the angular bars. Horizontal bars are fixed to the inner ends of the gate sections entending through slots or other connections in the vertical bars, and being cut away and adapted to overlap at their meeting ends so that these overlapping ends when the gate sections are extended are united by two or more of the vertical bars which slide over them, thus greatly increasing the rigidity of the structure.

CARBURETOR.—B. L. Ryder, San Jose, Cal. No. 583,126. Dated May 25, 1897. This invention relates to that class of vaporizers of gas generators especially adapted for use in connection with explosive engines in which gasoline or other vaporizable liquid is supplied to an absorbent material through which air is drawn to form an explosive mixture. The invention consists of an exterior shell, having a recess of depression for the vaporizable liquid in its lower portion, a protecting shield around the well having its bottom apertured and its top provided with a screen, a cap for the casing having a downwardly extending flange, an outlet pipe passing through the cap, a holding ring suspended from the flange of the cover having a diameter sufficiently less than that of the shell or casing to leave a circumscribing space, also being sufficiently shorter to leave an underlying space, an inlet for the liquid directing it to the absorbent material and into the well with a valve and float and intermediate connections whereby the valve and the air inlet are automatically operated.

LETTER COPYING PRESS.—Martin P. Boss, San Francisco, Cal. No. 583,245. Dated May 25, 1897. This invention relates to that class of copying presses for letters and other documents in which a vertically movable presser plate descends upon the copying book with its confined pads and letter, and forces the book against the bed-plate. It consists essentially of a tilting pressure-plate adapted when raised from the book to tilt by gravity to afford space for the removal and insertion of the book with a minimum of adjustment. It also consists in a lever and novel connections whereby the plate is operated and in combination with the operating connections of a means by which the initial adjustment of the pressure plate is effected.

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Yours truly, (Signed) J. R. DELAMAR.

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DELAMAR'S NEVADA GOLD MINING CO.,
SALT LAKE CITY, UTAH, Nov. 24, 1896.

BRADLEY PULVERIZER CO. *Gentlemen:*—In answer to your inquiry as to what the "Griffin Mill" is doing at our DeLamar Mill, DeLamar, Nevada, we beg to state that we often run 150 tons per day with 10 of your mills in operation, and on one occasion these 10 mills produced 408 tons in one day. I have no hesitancy in stating that they will regularly produce at least 30 tons per day each on our ore, which is extremely and unusually hard.

Yours very truly, H. A. COHEN, *General Manager.*

These strong letters coming from such representative men are conclusive evidence that we are right in claiming that the "Griffin Mill" will produce a larger amount of finer pulp at less cost than any other stamp or pulverizer made.

Let us send you a free copy of our illustrated pamphlet, which will tell you all about the Mill and bring to you other evidence of its great achievements.

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The right of the advertiser to know the measure of his purchase in circulation is no less than the right of the publisher to know the weight of print paper received from the mill.

FOR SALE.

Compound and ::: SIMPLE LOCOMOTIVES
of the SOUTH SIDE ELEVATED R. R. . .



First-Class Condition—Baldwin Locomotive Works, builders. **Standard** gauge. **Fuel,** hard or soft coal, coke or wood. Weight in working order, about 56,000 lbs. On drivers, about 40,000 lbs. **Cylinders**—single expansion, 13 in. by 16 in. stroke; compound, 9 in. and 15 in. by 16 in. stroke. **Driving wheels,** 42 in. diameter, steel tired. **Driving wheel base,** 5 feet. **Tank capacity,** 750 gallons. **Westinghouse Automatic** air brakes. Subject to any inspection desired. Built in 1893. Offered at greatly reduced prices. Road being equipped with electricity. For sale exclusively by

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For Placer Mining.

THE EDISON GOLD SAVING MACHINE.

The Most Complete Machine in the World for GRAVEL WASHING.

Guaranteed to Save Every Particle of Flour and Flake Gold, and Floured Quicksilver.

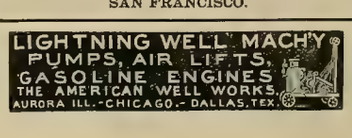
WILL HANDLE 3 TONS OF GRAVEL PER HOUR.

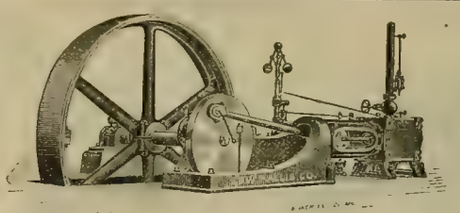
Minimum power and water required. Requires but one handling of gravel. By motion of machine water is returned and used over and over again. Light, durable and easily transported. Simple in construction and inexpensive.

The EDISON MACHINE COMPANY,
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OF SAN FRANCISCO.
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Silver Plated Copper Amalgamating Plates
For Saving Gold in Quartz and Placer Mining.
Every Description of Mining Plates Made.

ONLY BEST COPPER AND REFINED SILVER USED. OLD MINING PLATES REPLATED. TWENTY-SIX MEDALS AWARDED. GOLD, SILVER, NICKEL, COPPER & BRASS PLATING.

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Telephone, Main 5931. Send for Circular.

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By shipping your ores to us you can obtain the highest prices paid on competitive bids in the public market, together with a careful and accurate sample, as with our new mill and improved machinery we are able to give perfect satisfaction to all shippers. *Write for our Pocket Reference Book.* The highest cash price paid for gold bullion and old gold. Prompt returns.

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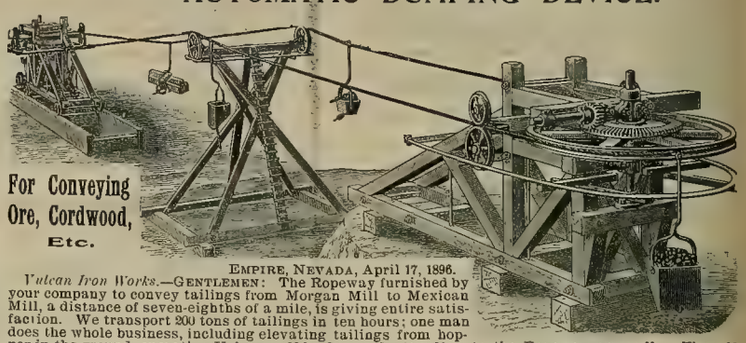
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VULCAN ROPEWAY

—WITH—

AUTOMATIC ORE LOADER AND AUTOMATIC DUMPING DEVICE.



For Conveying Ore, Cordwood, Etc.

EMPIRE, NEVADA, April 17, 1896.

Vulcan Iron Works.—GENTLEMEN: The Ropeway furnished by your company to convey tailings from Morgan Mill to Mexican Mill, a distance of seven-eighths of a mile, is giving entire satisfaction. We transport 200 tons of tailings in ten hours; one man does the whole business, including elevating tailings from hopper in the ground, operating Vulcan self-loader, and attending to the Ropeway generally. The self dumper requires no attention whatever. The Vulcan loader I consider the best feature in the whole Ropeway, making it possible for one man to load 200 tons in ten hours.

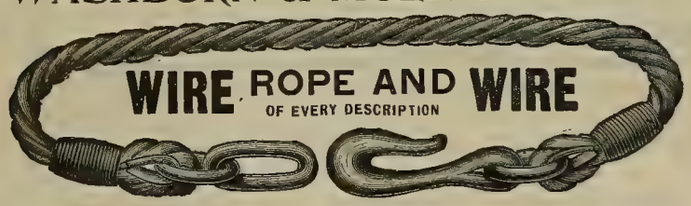
Yours very truly, J. P. WOODBURY, Supt.

VULCAN IRON WORKS,

MANUFACTURERS OF MINING MACHINERY,

Office, 505 Mission Street, San Francisco, Cal.

WASHBURN & MOEN MFG. CO.



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IF YOU HAVE A SMELTER--YOU WANT IT.
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IF YOU HAVE A CYANIDE PLANT--YOU OUGHT TO HAVE IT.
IF YOU OWN CHLORINATION WORKS--YOU SHOULD BUY IT.
IF YOU ARE INTERESTED IN A MINE OR MILL--YOU CAN'T DO WITHOUT IT.

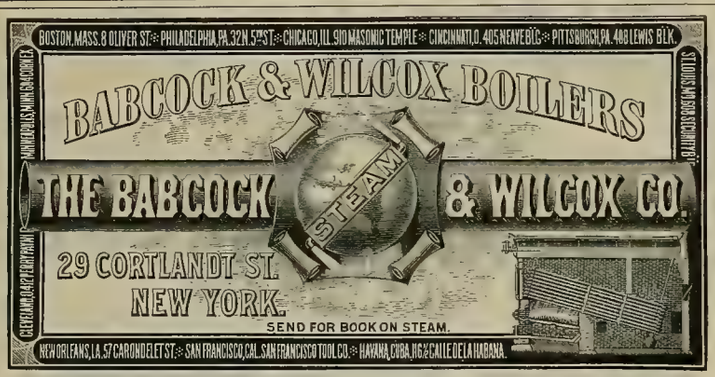
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IT IS ABSOLUTELY ACID PROOF---TRIED AND PROVEN.

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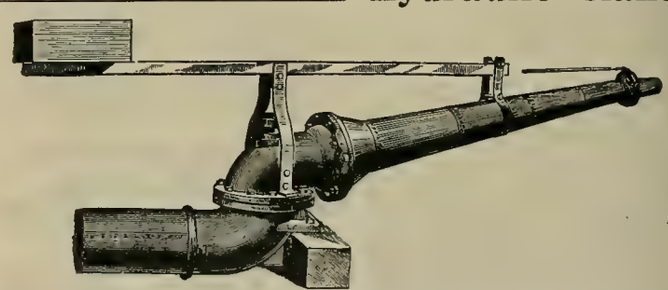
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Cams, Tappets, Bosses, Roll Shells and Crusher Plates.



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ENGINEERS AND MANUFACTURERS OF **MINING AND METALLURGICAL MACHINERY.**

Beg to announce that they now manufacture and control the sale of the unrivaled

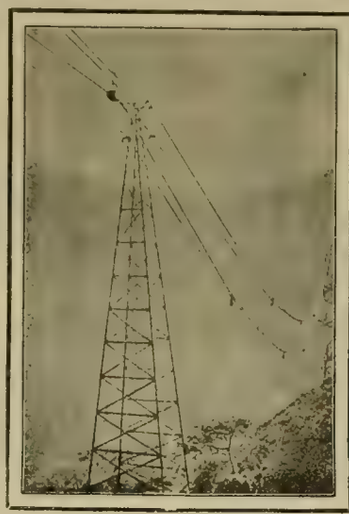
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Under any head and any requirement as to capacity.

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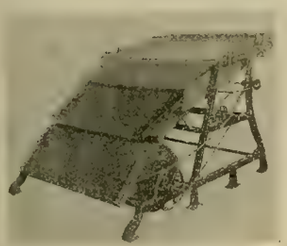
It that which gives the largest results in proportion to the amount expended.

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A GUARANTEE WITH EACH MACHINE.

This machine is the finest gold saver for both placer mines and quartz mills. No other plate necessary in mills where the Pacific Amalgamator is used. THE PACIFIC MINING MACHINERY CO., 127 First Street, San Francisco, California.

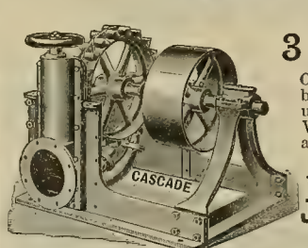
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TURBINE AND CASCADE WATER WHEEL

Adapted to all Heads from

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Our experience of **33 YEARS** building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

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THE CHEAPEST PLACE ON EARTH TO OUTFIT A MINE

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THE J. H. MONTGOMERY MACHINERY CO., 1220-22 Curtis Street, Denver, Colo., U. S. A.

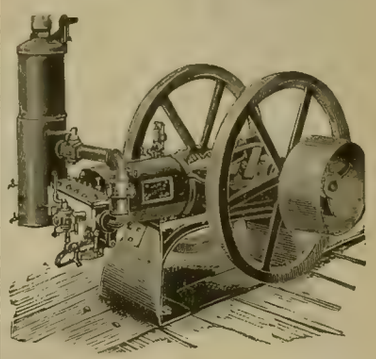
Just Listen—Reliable Common Sense Steel Whim, price reduced to $100. Steam Hoisters, $300 and up; hand hoisters $30; steel ore buckets all prices; prospectors' stamp mills $300. A 10-stamp mill, new, 850 lb. stamps, high mortars, latest improved. Only $800.





Ores tested and amalgamation and concentration mills built to **fit the ore** and guaranteed to save what we say. Coal Mine equipments, Screens, Jigs, Tramways, Arastors, Chilian Mills, Ore Sacks, etc. Cornish Rolls, 12x20, weight 6,000 lbs., price $350; Feeders, Bumping Tables; Blake Crushers, 7x10, weight 8,100 lbs, only $250. Our 100 page illustrated catalogue FREE.

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"DANIEL BEST" Crude Oil Engine.

This Engine can be operated on either Crude Oil, Distillate, Gasoline, or Kerosene. **It is the cheapest power on earth** and is not tied to any one kind of Oil, but can use any kind that will make gas and is not handicapped by being compelled to use a certain Oil. Do not forget this when in need of an Engine.

We guarantee our Engines to work perfectly on California Crude Oil, or Distillate, or any other kind of gaseous Oil; we however prefer CALIFORNIA CRUDE OIL, from Coalinga, Fresno county, for the reason that gas from Crude Oil will produce more power from the number of feet of gas used than from any other Oil, and it is also a natural lubricant as well, the valves being always lubricated sufficiently to prevent them from sticking, thus assuring greater durability of the working parts than it otherwise would be in using dry gas. And another advantage we claim is, that danger from explosions is reduced to a minimum, there being no accumulation of gas, but is used by the Engine as fast as it is generated and hence is absolutely safe. The following is a test that we made with one of our Five-Horse Power Crude Oil Engines, running ten hours on the different gas oils:

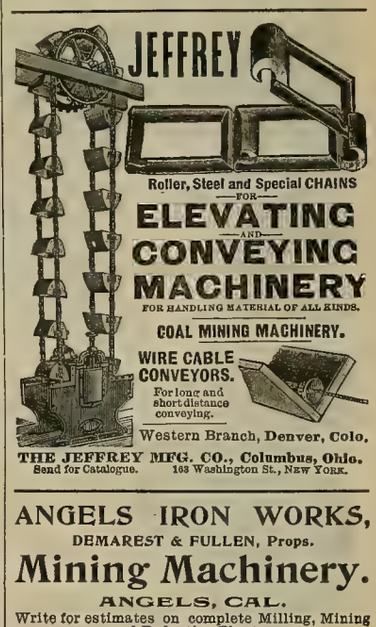
California Crude Oil, 40 grav.,	7½	gals. at	5c.,	$.37½
Distillate	40	" 7½	" 8c.,	.60
Domestic Coal Oil	40	" 7½	" 12½c.,	.93¾
Gasoline	74	" 8¾	" 15c.,	1.31¼
City Gas	1000	feet,		2.00

We manufacture all sizes from two-horse power up, and will guarantee that our Engines will run cheaper and are more simple in construction, have fewer parts and hence are more durable than any other Gas Engines on the market. Seeing is believing; don't take our word for it, but come and investigate for yourselves. You can always see one in operation at our works. We will be pleased to see you and will at all times take pleasure in showing them up. Our Engines are specially adapted for running well and mining machinery—in fact, for any kind of power desired. We are the pioneers and first inventors of Crude Oil and Distillate Engines. **We always lead and never follow.** Send for Catalogue and Price List of the only genuine Crude Oil and Distillate Engine made.

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Roller, Steel and Special CHAINS
—FOR—
ELEVATING AND CONVEYING MACHINERY
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COAL MINING MACHINERY.

WIRE CABLE CONVEYORS.
For long and short distance conveying.

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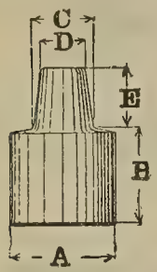
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Write for estimates on complete Milling, Mining and Reduction Plants.

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C=..... "
D=..... "
E=..... "

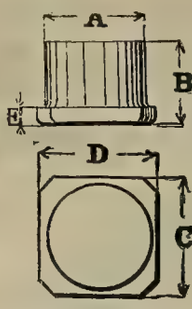
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We beg to call attention to our "RISDON HAMMERED" Shoes and Dies, which are made of a special quality of steel, are hammered and then compressed in moulds so as to give the greatest possible density.

These Shoes will outlast any other make and will not chip or cup.

We have attached a sketch showing sizes; fill in the size of your Shoes and Dies, and order a trial set.

Our prices are as low as any, and the article we offer should commend it to all mine owners and mill men.



A=.....inches.
B=..... "
C=..... "
D=..... "
E=..... "

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Principal Office: NO. 42 FREMONT STREET. - - Works: Corners Bay, Kearny and Francisco Streets, SAN FRANCISCO, CAL.

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Hydraulic Mining Machinery,

Comprising Hydraulic Gravel Elevators, Double-Jointed Ball-Bearing and Single-Jointed Giants, Sheet-Iron and Steel Water Pipe and Fittings, Water Gates, Etc.



HYDRAULIC GRAVEL ELEVATOR (in position.)

NOTICE.—All other forms of Hydraulic Gravel Elevators are simply poor imitations in construction and infringements of the patents held by us.

The Double-Jointed Ball-Bearing Giants recently perfected and patented by our MR. JOHN H. HENDY are incontestably superior to any other form of Giants yet introduced.

We are prepared to furnish plans and estimates of cost of any proposed Hydraulic Mining Plants upon any specifications submitted to us, and tender the services of our Hydraulic Mining Engineer to erect and place same in successful operation under guarantee.



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Patented in U. S. and Other Countries. Capital, £100,000.

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Gold and silver values, both fine and coarse particles, are by the PELATAN-CLERICI PROCESS recovered direct from ore without roasting as pure amalgam, and the precious metals are saved in the form of fine bullion without any refining costs.

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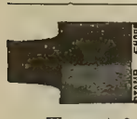
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PATENTEE { Brown's Complete Automatic Mill Process. Brown's System of Mechanically Stirred Roasting, Cooling and Conveying Furnaces, Etc.

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— THE CELEBRATED —

HAMMERED STEEL SHOES AND DIES.



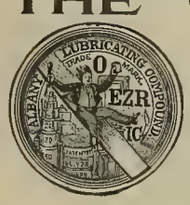
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ALBANY LUBRICATING COMPOUND.

The King of Lubricants!

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ESTABLISHED 1860.

BRANCHES AT Washington, London, Paris, Berlin, Vienna, Melbourne, Etc.

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TAKE ELEVATOR No. 12 FRONT ST.

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HAVE REMOVED THEIR

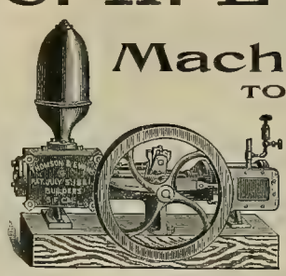
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Where, with Enlarged and Increased Facilities, they are better than ever prepared to do

First-Class Machine Work

Promptly, and at Reasonable Prices, and will continue the manufacture of



Thomson & Evans Steam Pumps,

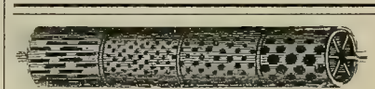
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Riveted Steel Water Pipe.

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A specialty. Round, slot or burred slot holes. Genuine Russia Iron, Homogeneous Steel, Cast Steel or American planished Iron, Zinc, Copper or Brass Screens for all purposes. CALIFORNIA PERFORATING SCREEN CO., 145 and 147 Beale St., S.F.

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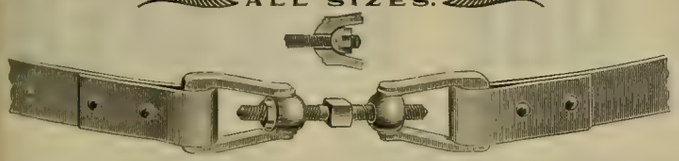
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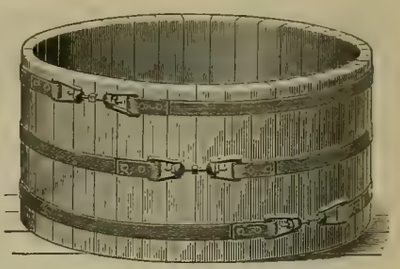
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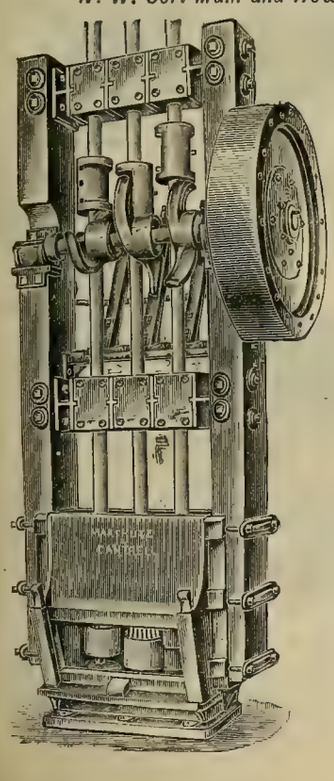
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IMPROVED PORTABLE HOISTING ENGINES.

Improved Self-Contained Three or Five Stamp Mill,

Saves bill for heavy timbers, millwright and mechanics' labor, and a large amount of space. The term self-contained means a great deal for the mine owner, and can be readily recognized and appreciated in making an estimate for an ordinary plant when the comparative cost is considered.

FIRST: There is saved a large bill for heavy timbers, in many instances obtained at great expense and loss of time.

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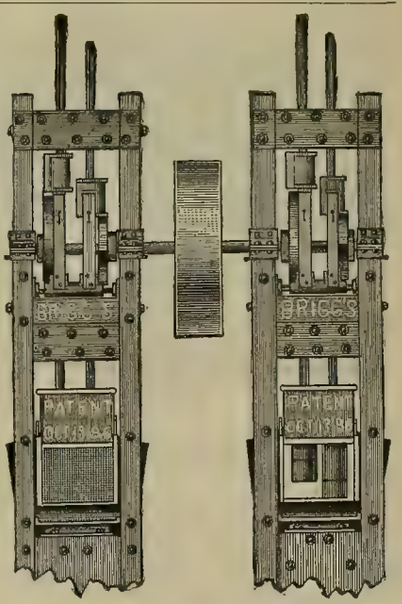
Rock Breakers, Ore Feeders, Concentrators, Engines and Boilers, Hoisting Rigs to be operated by Horse, Steam Power, or any other motor; **Ore Cars and Ore Buckets, Cornish and Jack-head Pumps, Triple-Acting Pumps, Centrifugal Sand and Gravel Pumps, Wooden Tanks and Pumps for the Cyanide Process, Pipe and Gate Valves, Link Chain Elevators** for elevating and conveying all kinds of material.

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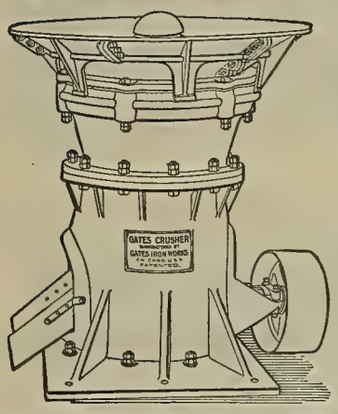


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still leads the world. It has greatly cheapened the cost of macadam and ballast, and made low grade ores profitable 180 large sizes shipped to South Africa.

General Mining Machinery

of improved designs. Nothing equal to

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The Gates Improved Vanner Concentrators.

Every appliance for the mining and milling of ores.

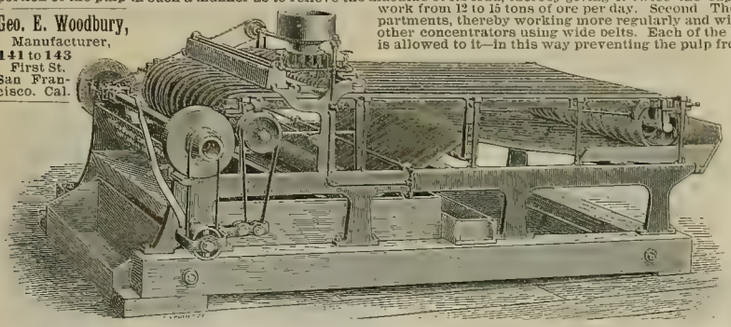
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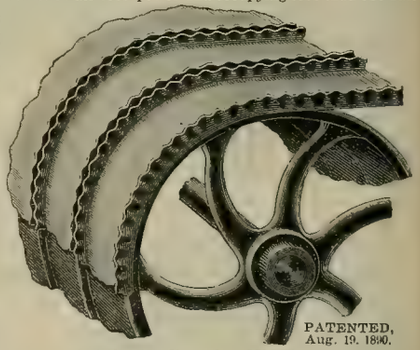
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THE WOODBURY ORE CONCENTRATOR WITH IMPROVED BELTS

was awarded the Highest (Bronze Medal) Premium at Mechanics' Institute, 1890 and 1891. MORE THAN DOUBLE THIS CAPACITY with one-half less power and occupying less than one-half the space of any other concentrator. Built of best Steel and Wrought Iron. Strong and durable. Price $575 f. o. b. Send for Catalogue and Testimonials. The annexed cut shows the belt in its improved form, which consists of corrugated edges, to form an expanding top edge. THE IMPROVED MACHINE HAS THE FOLLOWING MERITS: First—The Improved belts, which consist of seven, are constructed and arranged so as to allow each belt to receive a portion of the pulp in such a manner as to relieve the machine of its load, thereby giving it twice the capacity of other concentrators, and enabling it to work from 12 to 15 tons of ore per day. Second—The machine equalizes the load by several compartments, thereby working more regularly and with much less attention than is necessary to give other concentrators using wide belts. Each of the belts on this machine takes care of the pulp that is allowed to it—in this way preventing the pulp from running to the lower side of it, as is the case when a machine becomes out of level where wide belts are used. Third—The belts run on a perfect line, needing no adjustment to prevent their running from side to side, as in other concentrators. Fourth—The belt surfaces are improved by indentations and corrugations, causing the Concentrator to save fine sulphurets and quicksilver, and perform close work. Fifth—The belts have fluted or corrugated edges, to form an expanded top edge, which effectually prevents from cracking. Sixth—The feed arrangement is perfect. Seventh—The machine is constructed of iron, with steel crank-shaft self-oiling boxes, and everything made in the most thorough manner, enabling it to run with very little attention or wear.

Geo. E. Woodbury,
Manufacturer,
141 to 143
First St.
San Francisco. Cal.





PATENTED, Aug. 19, 1890.

This Concentrator took the 1st prize at the San Francisco Mechanics' Institute in 1890, 1891 and 1892, and at the California State Fair in 1892; it took the 1st. prize at the World's Columbian Exposition 1893, and at the San Francisco Midwinter Fair, 1895.

THE GUTTA PERCHA AND RUBBER M'F'G CO.

30 and 32 FREMONT ST., SAN FRANCISCO.

Spadone's Concentrator Belts. Patented.

The "SPADONE" Curved Edge Concentrator Belt is attracting much attention among mining men, its merits appealing to the millman of practical experience.

Illustration (Fig. 1.) shows a cross-section, and (Fig. 2.) shows the edge flanging outwardly as it passes over the pulley. This relieves the strain from the top and bottom of the edge by directing the strain automatically to the inside face surface of the edges. Heretofore all belts have been so constructed that when they pass over the pulleys or rolls, a direct strain comes upon the top or at the base of the edges, causing the edges to break away from the body of the belts in a very short time. *We avoid this Mechanical Defect by our Spadone Curved Edge.* Belts made to fit any machine—4, 5 and 6 feet wide. Prices and samples on application.

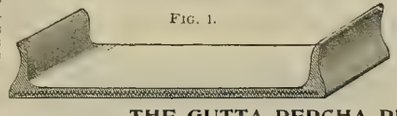


FIG. 1.

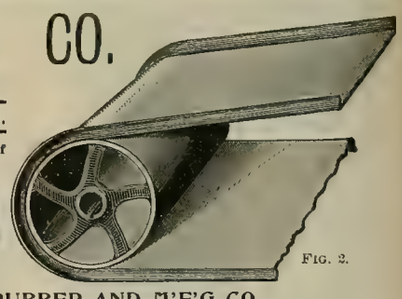


FIG. 2.

We shall be pleased to quote you also on Water, Air Drill, Steam, Suction and Fire HOSE, RUBBER BELTING and RUBBER PACKING. Correspondence Solicited.

THE GUTTA PERCHA RUBBER AND M'F'G CO.
TELEPHONE, MAIN 1813.

CALIFORNIA ELECTRICAL WORKS.

Dynamos, Motors, Hoisting Apparatus, Arc and Incandescent Lamps, Instruments, and General Supplies.

TELEPHONE AND LINE CONSTRUCTION. LONG DISTANCE POWER TRANSMISSION A SPECIALTY.

Office and Works: 409 MARKET ST., SAN FRANCISCO, CAL.

THE FINLAYSON PATENT WIRE ROPE TRAMWAY.

THIS TRAMWAY IS THE BEST THAT HAS EVER BEEN PLACED ON THE MARKET IT HAS NO RIVAL. IT IS STRICTLY AUTOMATIC AND ITS CAPACITY RUNS UP TO 1000 LBS. PER BUCKET. ANY ONE CONTEMPLATING THE ERECTION OF A TRAMWAY SHOULD INVESTIGATE ITS MERITS BEFORE PURCHASING ELSEWHERE. . . . . .

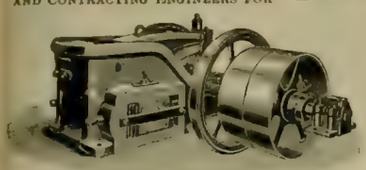
THE COLORADO IRON WORKS COMPANY, Denver, Colo.

SOLE AGENTS AND MANUFACTURERS.

WE ARE MANUFACTURERS OF AND CONTRACTING ENGINEERS FOR **Gold, Silver, Lead, Copper and Pyritic SMELTING FURNACES.**

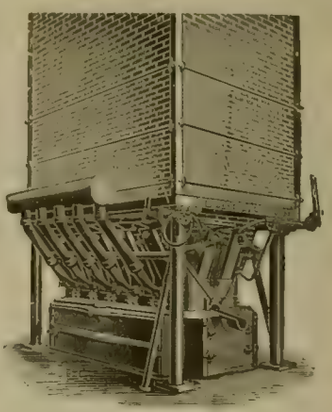
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We Guarantee Capacity Per Day to Any Degree of Fineness.



Improved Black Hawk Ore Breaker.

OUR PATENT HOT BLAST APPARATUS for all Smelting Furnaces is a Success. A great economizer of fuel, and enlarges capacity of furnace.



Standard Silver-Lead Water Jacket Smelting Furnace.

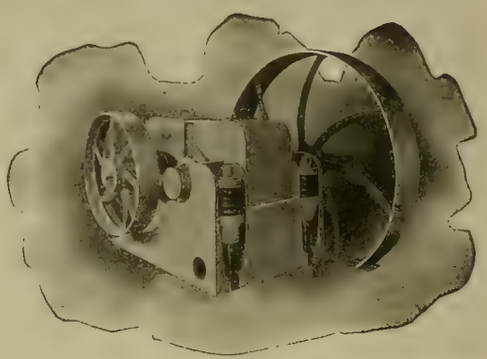
Equipped with Arch-Bar System of Mantles, insuring rigid and strong walls. No Cracks.

Denver Crushing Rolls!

Constructed Upon New Principle!

SIMPLE! COMPACT! STRONG!

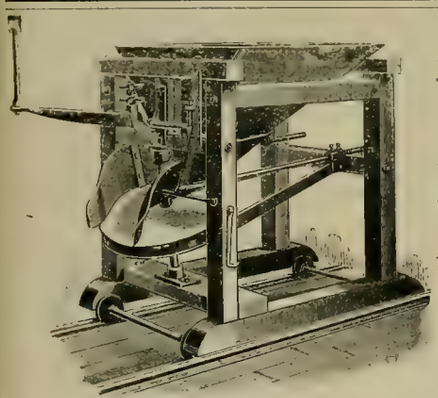
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Denver Engineering Works Co., Denver, Colorado, U. S. A.



Millmen! Investigate This.

POSITIVE FEED. MINIMUM POWER.

Bolthoff Improved Challenge Automatic Ore Feeder.

The only revolving disc feeder, made without gears or clutches. Feeds wet or dry ore; slow or fast. Is operated by a Friction Band. We have other valuable stamp mill improvements.

WHEN WRITING FOR CIRCULARS AND PRICES MENTION THIS PAPER.

Hendrie & Bolthoff M'f'g Co., DENVER, COLORADO.

The Mine and Smelter Supply Co., Denver, Colo.

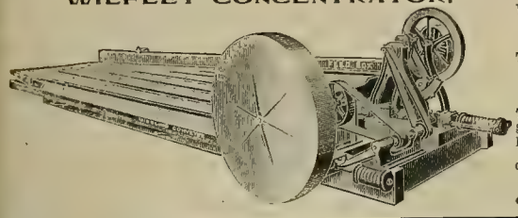
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PIPE, PACKING, RUBBER BELTING, AND SUPPLIES OF ALL KINDS.

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And claim for it BETTER work than any Concentrator made, with a capacity of from 15 to 25 tons per day of 24 hours. It is simplicity itself. No moving belts or intricate parts. Any one can learn to operate in an hour.

WILFLEY CONCENTRATOR.



For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Colo.; Mary Murphy Mine, St. Elmo, Colo. W. E. Renshaw, Mayflower Mill, Idaho Springs, Colo.; H. E. Woods, Denver, Colo.

— GENERAL OFFICES OF —

THE DURANT MINING CO. THE LATE ACQUISITION CONS. MINING CO. THE COMPROMISE MINING CO. THE ASPEN SAMPLING CO. THE CONOMARA MINE. THE SMUGGLER CONCENTRATOR. THE SMUGGLER MINING CO.

ASPEN, COLORADO, April 8, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Your favor of the 5th inst. at hand and noted. In regard to the Wilfley Table I wish to say that I consider it to be the best device in use to-day for concentrating fine ores; that it will save everything that a gold pan will; that it combines the clean saving of a Rittinger with the capacity of a buddle. I think that without question it will supplant in time all other devices for handling fine and slimy ores. This includes all the vanning machines and buddles.

This is higher praise than I am in the habit of giving, but I feel sure that it is deserved, and you may make any use of this that you desire. Yours very truly, [SIGNED] S. I. HALLETT.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession. ✦ ✦ ✦

PRICE, $450.00.

The Best Time to Advertise : :

In the MINING AND SCIENTIFIC PRESS is when you want More Business.

DEWEY & CO. PATENTS SCIENTIFIC PRESS PATENT AGENCY 220 MARKET ST. S.F.

Market Reports.

The Markets.

SAN FRANCISCO, June 3, 1897.

With the grocery and hardware trade the volume of goods going out is in excess of last year, but the value footings do not show much difference, owing to the lower prices ruling, caused largely by strong competition. The very general opinion prevails with the trade that in many lines better prices ought to rule this fall, and also that there should be a large increase in the volume of goods going out. This opinion is formed from confirmed advices through correspondence and also by information by traveling salesmen that crops in this State, and, as for that, throughout the Coast, will be larger than last year. This will call for the employment of more hands. Besides this, there has been a steady influx of miners and others into new mining districts. There has been, also, an accession to the population in the older mining districts by reason of renewed activity in gold mining, with older mines being more actively worked, abandoned ones being opened up, and work being done on new property.

The local money market is practically unchanged. The call for funds is light, considering that the harvest season is at hand. It is stated that about all requirements are being met by interior banks, while each week there are shipments of stuff on which advances have been made. This unties more funds. It is a disputed point, as yet, regarding requirements for crop-moving purposes. This, no doubt, is due to no definite information as to whether farmers will generally meet the market by selling their grain or store the larger proportion. If the latter is done then more money will be required. The movements of green fruits to the East are assuming larger proportions, which is giving more Eastern exchanges, yet the supply is not up to the demand yet, which causes high rates of premiums to rule. The East reports a continued plethora of available funds, but with a revival of dealing in speculative securities, there is an improving inquiry for call loans. The commercial and manufacturing interests are not in the market for funds to any extent, as yet. European advices report easy money markets with good loans quickly placed.

New York Silver Prices.

NEW YORK, June 3.—Following are the closing prices for the week:

	London.	N. Y.
Friday	27 9-16	60⅛
Saturday	27 9-16	60⅛
Monday		
Tuesday	27⅝	60⅛
Wednesday	27 9-16	60
Thursday	27 9-16	60

	Copper.	Lead.	Iron.	Tin.
Fri.	10 75 @11 25	3 25	10 00@12 00	13 60
Sat.	10 75 @11 25	3 25	10 00@12 00	13 60
Mon.	@	@	@	
Tue.	10 90 @11 25	3 27½	10 00@12 00	13 55
Wed.	10 90 @11 20	3 27½	10 00@12 00	13 45
Thur.	10 90 @11 20	3 27½	10 00@12 00	13 45

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	15c Prem
New York Telegraphic Transfer	17½c Prem
London Bankers' 60 days	$4.87
London Merchants	$4.85
London Sight Bankers	$4.88½
Refined Silver, per oz., 1000 fine	60
Mexican Dollars	49@50

SILVER.—The market at the East has strengthened slightly, in sympathy with London, which moved up a peg under a little improvement in the demand from India. The wants of China and the Straits continue small, compared with previous years. Press telegrams from abroad report changing views regarding bimetallism. It is stated that there is a growing sentiment favorable to an international convention on the subject. It looks, if this is so, as if the market value of the white metal ought to advance; therefore the reports are discredited or else exaggerated.

MEXICAN DOLLARS.—The demand continues light and confined to small quantities. Large remitters prefer exchange, which can be had for slightly less money.

QUICKSILVER. — The market is fairly steady. Export clearance for Mexican ports the past month aggregate 100 flasks.

Our market is quoted at $40.50 for domestic consumption.

COPPER.—Our market is steady. Eastern advices are practically unchanged. The production continues large, which keeps prices slightly in favor of buyers, notwithstanding the very heavy consumption abroad.

The local market is quoted as follows:

Ingot, jobbing	—@14
Ingot, wholesale	—@13
Sheet copper	—@17
Bolt	½ & 5-16, 20c; ⅜ and larger, 17

TIN.—The market for pig at the East and abroad strengthened some, but towards the close they were easier. Our market held steady. The tone is said to be firm both at home and abroad.

We quote as follows in a jobbing way:

Pig, per lb	14c@ —
Plate, I C coke, heavy, per box	$4 00@ 4 15
" " " light, " "	3 90@ —

LEAD.—There is a good consumption demand both here and at the East, but it is met by sellers without any advance in prices.

Our market is quoted in jobbing lots as follows:

Pig	4 00	@	4 25
Bar	—	@	4 50
Sheet	5 62½	@	6 12½
Pipe	4 87½	@	5 37½

SHOT.—There is a fair jobbing demand.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

POWDER.—The demand from the mines seems to be increasing.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

BORAX.—The feeling is stronger in anticipation of higher tariff.

The market is quoted as follows:

Refined, in carload lots, in barrels	5
Refined, in carload lots in sacks	4¾
Powdered, in car lots	5
Concentrated, "	4½

IRON.—Our market is irregular, with some cutting reported. At the East there is continued strong competition between sellers. Shipments abroad continue to be made by Southern furnacemen.

AMERICAN.	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50
ENGLISH.		
Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—The consumption of steam shows a slight increase. Imports are lighter. The market is reported steady.

We quote as follows:

SPOT FROM YARD—PER TON.	
Wellington	$8 00@— —
Greta	6 00@ 6 50
Nanaimo	6 50@ 7 00
Gilman	5 50@ 6 00
Seattle	5 50@ 6 00
Coos Bay	—@ 4 75
Cannel	8 00@— —
Egg, hard	12 00@13 00
Wallsend	6 50@— —
TO ARRIVE—CARGO LOTS.	
Australian	5 50
Liverpool Steam	6 25
Scotch Splint	— —
Cardiff	6 25
Lehigh Lump	9 00
Cumberland	13 00
Egg, hard	10 00
West Hartley	6 50

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

ANTIMONY.—The market is dull and easy.

Our market is quoted at 7¼@8¼c in a jobbing way. New York mail advices quote 7⅛c for Cookson's, 6⅞@7⅛c for Hallett's and 6⅞@7c for Japanese.

NAILS.—The market is strong at an advance, with still higher figures looked for.

Wire, carloads, basis per keg	— —
" jobbing, " "	$2 35
Cut, carloads, " "	— —
" jobbing, " "	2 25

PLATINUM.—Very little doing.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC.—The market is firm at quotations.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady.

We quote in jobbing lots at 50 cents per pound for ingots.

Chemicals.

There is absolutely nothing new to report in our market. Tariff legislation is being watched and until the character of the bill is well assured no changes are looked for. Outside of a slight advance in sal soda at the East, no changes are reported there.

SPELTER.—The market is slow but holders are firm.

We quote our market in a jobbing way at 5 cents a pound.

BISMUTH.—The market is firmer.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is easy.

We quote in a jobbing way at 70 to 75 cents per pound.

BONEASH.—There is a good shipping demand.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is steady at 3c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a fair demand at 2½c a pound from stores.

NITRATE OF SODA.—The movement is light.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

SULPHURIC ACID.—The demand is light.

We quote in a jobbing way at 1½c per lb for 66%.

NITRIC ACID.—Our market is reported steady from store at 6½@7c per pound in carboys.

BLUE VITRIOL. — Our market is fairly steady.

We quote in a jobbing way at 4½c per pound.

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MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied, Delinq't and Sale.	Secretary.
Alta S M Co, Nev	56	5c	May 21..June 25..July 16	J E Jacobus, 309 Montgomery
Bullion M Co, Nev	50	10c	May 4..June 8..June 28	R R Grayson, 331 Pine
Challenge Con M Co, Nev	23	10c	May 13..June 16..July 8	C L McCoy, Mills Bldg
Chollar M Co, Nevada	43	15c	May 10..June 15..July 8	C E Elliott, 309 Montgomery
Eureka Con D M Co, Cal	8	5c	Apr 2..May 15..June 5	D M Kent, 330 Pine
Gould & Curry S M Co, Nev.	81	20c	Apr 29..June 1..June 22	Alfred K Durbrow, 309 Montgomery
Jamison M Co, Cal	9	5c	Nov 27..June 23..Aug 18	Sam W Cheyney, 120 Sutter
Marguerite G M & M Co, Cal.	6	10c	Apr 12..May 24..June 21	F Mettmann, 237 Twelfth
Occidental Con M Co, Nev	27	10c	May 11..June 12..July 1	Alfred K Durbrow, 309 Montgomery
Overman S M Co, Nev	77	10c	Apr 12..May 17..June 7	Geo D Edwards, 414 California
Pine Hill G & S M Co, Cal	10	5c	May 10..July 1..July 23	Chas A Hare, 1003 Railroad Ave
Rock Island G & S M Co, Nev.	14	2c	May 20..June 25..July 6	W W Guptill, 309 Montgomery
Savage M Co, Nev	92	20c	Apr 13..May 17..June 7	E B Holmes, 309 Montgomery
Sulphur Bank Q M Co, Cal	5	25c	Mar 23..May 3..June 3	T Wintringham, 306 California
Thorpe M Co, Cal	6	2½c	Apr 14..June 7..June 27	A F Frey, Phelan Building
Union Con S M Co, Nev	54	20c	Apr 7..May 11..June 1	A P Swain, 309 Montgomery

Mining Share Market.

SAN FRANCISCO, June 3, 1897.

The market has been spasmodically active with the bulk of trading reported in the informal session, when cross-orders worked successfully to either depress or advance prices. Chollar continued the leader for shares in the middle group of mines and Con. Virginia for the north end. The south end or Gold Hill shares did not sympathize much. Chollar fluctuated between $1.10 and $1.25 and Con. Virginia between $1.75 and $1.95. The showing of ore in the former on the Brunswick lode ought to cause better prices, and would have done so years ago, before the trading public lost considerable confidence. Last week over 260 tons of ore was extracted and milled which assayed over $20 in gold and 18 ounces in silver to the ton. This is a good showing, when it is remembered that work in the mine has shown up large quantities of ore that can be extracted at a profit. From the general tenor of our advices the ore runs into Potosi, and it ought not to cause surprise if the latter mine prove the richer. This, of course, can be determined only by running a crossdrift in Potosi near the Chollar line. The work that is being done in Con. Virginia is showing well for the mine. It looks as if it is being done for the purpose of more fully developing the ore found in the workings from the 1650-foot level, for the purpose of extracting more ore; but it takes considerable to meet the current expenses of the company, owing to the amount of active work that is being done. Last week 115 tons of ore were raised and milled, which went over $72 to the ton. News from the long joint west crossdrift of Con. Imperial-Challenge-Confidence was at last official advices in soft vein matter, which affords encouragement to long-suffering shareholders. Unless the work is stopped, it ought to strike the west lode within the next sixty days; but before this is done they may have to quit work temporarily, so as to let the water drain off, which common report says is in the west. The Standard Company, in the Bodie district, is getting everything in readiness for a more active season, both in the mine and milling of ore. It is the belief that the company will resume dividends before the year is out, notwithstanding it is said to be under considerable expense at present to get everything in readiness.

The news from the mines state that in about all good work is being done when the number of men employed is taken into consideration. In Utah they have started a north drift from the main west crossdrift. Work in the east crossdrift has been suspended. The west crossdrift from the Layton tunnel in Sierra Nevada has been extended a total distance of 450 feet without anything of special mention being discovered. Work is continued in it. In Union work is confined to the 900-foot level. They have started a south drift. The south drift on the 1000-foot level of Mexican was extended in 17 feet in a southwesterly direction. Total distance is about 180 feet. It passed through porphyry, seams of clay and streaks of low-grade quartz; total distance 174 feet. In Ophir work is confined to the central tunnel and 1000-foot levels. No change is reported in the west crossdrifts that are being run on these two levels. The official letter, which is confirmed by private advices, reports active and interesting work on the 1650-foot and 1750-foot levels. It indicates that considerable ground is being opened up for working more advantageously. As noted in the introductory above there was an increase in the number of tons taken out and assay value also. The work by Best & Belcher and Gould & Curry is done jointly to the east from the 800-foot Bonner shaft level. The distance in is about 500 feet. In Andes they are still running the north drift on the 175-foot level. In Savage and also Hale & Norcross there is nothing new to report. No work in Chollar. The work in Potosi is said to be largely of a dead character preparatory to more active work later on. The north drift in Bullion is being driven slowly ahead. They are driving ahead on the west crossdrift on the 500-foot level in Alpha. At last advices they were in a little over 500 feet. Particulars are given above about the Con. Imperial, Challenge-Confidence joint west crossdrift. In Confidence they are not raising ore, but they are in Overman. The latter milled over 130 tons going over $30 to the ton. Fair progress is being made jointly by Yellow Jacket, Kentuck and Crown Point to the west. From Crown Point nothing new is at hand. In Belcher private advices indicate more active work before long. Ore continues to be raised. They are still working on the 725-foot level of Alta.

From the Brunswick lode there is nothing new reported in the joint work of Con. Virginia, Best & Belcher, and Gould & Curry; neither is there anything new from Savage. Work in Occidental is continued on the 550-foot and 650-foot levels, with varying encouragement. In Chollar, work is being done from the 200-foot level to the 600-foot level. Persons familiar with the situation express satisfaction at the way the work is being done. This is always the case where large quanti-

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ties of ore are being taken out. The work that is being done is attracting considerable attention.

The following illustrates the changes of the week:

MINES.	May 27	June 3.
Alpha		
Alta Consolidated	$ 02	
Andes	20	
Belcher	$	17
Best & Belcher	65	50
Bodie		
Bullion	03	
Challenge	24	24
Chollar	1 15	1 15
Confidence		
Consolidated California and Virginia	1 80	1 75
Consolidated New York		
Crown Point	21	
Exchequer		
Gould & Curry	18	37
Hale & Norcross		76
Justice		07
Mexican	36	31
Ophir	90	85
Overman		
Potosi	64	66
Savage	34	29
Sierra Nevada	38	34
Union	34	28
Utah		
Yellow Jacket		26

San Francisco Stock Board Sales.

SAN FRANCISCO, June 3, 1897.

9:30 A. M. SESSION.

200 Con Cal & Va.....1 75
500 Ophir 85
100 Gould & Curry 37
300 Potosi..... 66
500 Justice 07
300 Yellow Jacket.... 26
250 Mexican..... 31

SECOND SESSION—2:30 P. M.

100 Sierra Nevada.... 34
200 Gould & Curry.... 35
500 Justice 06
300 Best & Belcher... 50
200 Challenge..... 24
540 Con Cal & Va.....1 75
500 Union..... 28
200 Savage..... 29
300 Caledonia..... 08
100 Chollar.....1 15
400 H. & N..... 76
300 Potosi..... 65
320 Ophir..... 82
100 Yellow Jacket.... 25
150 Mexican..... 31
50 Belcher..... 17

THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Hoey & Lewis, in the Parsons Gravel and Timber Claim in Brownsville Mining District, El Dorado Co., to deposit tailings in Little South Fork of Cosumnes River; from Daniel McLaughlin in the Morristown Mine at Morristown, Sierra Co., to deposit tailings in the Morristown Ravine; from Henry Northrop and Robert C. Nicholson, in the Etta Placer Mine near Sierra City, Sierra Co., to deposit tailings in North Fork of Yuba River; and from J. P. West, in the Mountain View Mine near Coutolenc, Butte Co., to deposit tailings in Little Butte Creek, gives notice that a meeting will be held at room 59, Flood Building, San Francisco, Cal., on June 14, 1897, at 1:30 P. M.

In the Superior Court of the City and County of San Francisco, State of California, Department No. 8. John V. Kimball, plaintiff, vs. Mabel L. Kimball, defendant. Action brought in the Superior Court, City and County of San Francisco, State of California, and the complaint filed in said City and County of San Francisco, in the office of the clerk of said Superior Court. The people of the State of California send greeting to Mabel L. Kimball, defendant. You are hereby required to appear in an action brought against you by the above-named plaintiff in the Superior Court, City and County of San Francisco, State of California, and to answer the complaint filed therein within ten days (exclusive of the day of service) after the service on you of this summons, if served within this county; or, if served elsewhere, within thirty days. The said action is brought to dissolve the bands of matrimony now existing between yourself and plaintiff, on the ground of habitual intemperance on your part for more than one year past. All of which will more fully appear in the complaint on file herein to which you are hereby referred. And you are hereby notified that if you fail to appear and answer the said complaint, as above required, the said plaintiff will apply to the said Court for the relief prayed for in the complaint. Given under my hand and seal of said Superior Court at the City and County of San Francisco, State of California, this 9th day of April, in the year of our Lord, one thousand eight hundred and ninety-seven. C. F. Curry, Clerk. By Joseph Riordan, Deputy Clerk. R. Thompson, Attorney for Plaintiff.

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Assessment Notices.

JAMISON MINING COMPANY. Location of principal place of business, San Francisco, California; location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9) of 5 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 26th day of March, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on SATURDAY, the 24th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 19th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of April, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on MONDAY, the 24th day of May, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 19th day of July, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of May, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on WEDNESDAY, the 23rd day of June, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 18th day of August, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 14th day of April, 1897, an assessment (No. 6) of .02½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 44 Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 22d day of May, 1897, will be delinquent and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 14th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

POSTPONEMENT.

The date of delinquency of the above assessment has been postponed to June 7th, 1897, and the day of sale to SATURDAY, June 26th, 1897, by order of the Board of Directors. A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

CHALLENGE CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Gold Hill, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the 13th day of May, 1897, an assessment (No. 23) of Ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, room 35, third floor, Mills building, corner Bush and Montgomery streets, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 16th day of June, 1897, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 8th day of July, 1897, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

C. L. McCOY, Secretary.

Office—Room 35, third floor, Mills building, San Francisco, California.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Silver Star Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 11th day of May, 1897, an assessment (No. 27) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of June, 1897, will be delinquent, and advertised for sale at public auction, and, unless payment is made before, will be sold on THURSDAY, the 1st day of July, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

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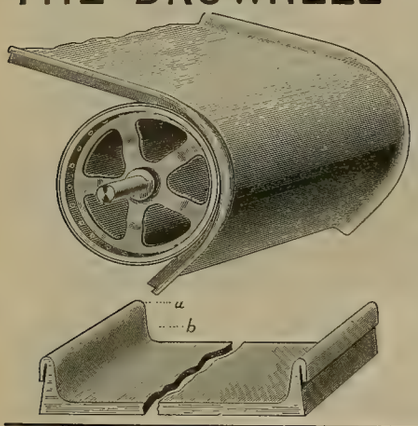
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ORIGINAL EMPIRE MILL & MINING COMPANY,
GRASS VALLEY, NEVADA CO., CAL., Feb. 20, 1897.

JAS. S. BROWNELL, ESQ., San Francisco, Cal.—DEAR SIR: The Brownell Patent Lip flange belt for ore concentrators, which I bought of you nearly two years ago, has been in constant use and is in good order and gives us perfect satisfaction. We have several other kinds of belts in the mill, and your belt and flange I consider the best of all. Yours respectfully, ROBT. WALKER, Superintendent.

ROANOKE MINING COMPANY,
MOKELUMNE HILL, March 5, 1897.

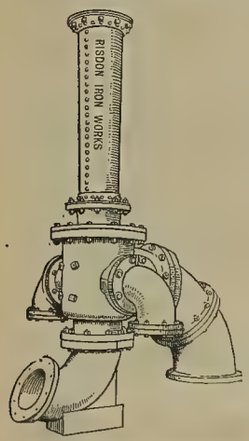
MR. JAS. S. BROWNELL, 132 Market St., San Francisco, Cal.—DEAR SIR: We have in our 20-stamp mill at this place five Frue vanners; three of these are equipped with the Patent Lip flange belt and two with the plain flange belt. We certainly consider the former a great improvement on the latter. They will certainly wear much longer, as cracking now seems out of the question. Any one purchasing the Frue vanning machine should see that it is equipped with the Patent Lip flange belt. Very truly yours, ROANOKE MINING COMPANY, Per G. M. WILDE, Acting Superintendent.

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Extracts from Letters Received from Mr. Philip Argall, Manager Metallic Extraction Co., Cyanide, Colorado:

January 2, 1897.

"The roasting is invariably good. We can do 80 tons per day to [illegible] sulphur, when everything runs smooth. Our month record which, of course, includes all delays [illegible] tons, from 1.94% sulphur to 0.16%."

February 19, 1897.

"Our furnace is now running very nicely indeed, averaging [illegible] per day to 0.10% sulphur, and doing excellent work; in fact, it has improved right along and we are highly pleased with it.

"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

The ROPP FURNACE is now in successful operation at the following reduction works: The Hanauer Smelting Works, Salt Lake City, Utah (one furnace); The Metallic Extraction Co., Cyanide, Colo. (one furnace); The Colorado-Philadelphia Reduction Co., Colorado City, Colo. (three furnaces); The Selby Smelting & Lead Co., Selby, Cal; (one furnace); The Mount Morgan Gold Mining Co., Rockhampton, Queensland (one furnace); and Broken Hill Proprietary Co., Broken Hill, New South Wales (two furnaces).

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The Big Horn Hot Springs.

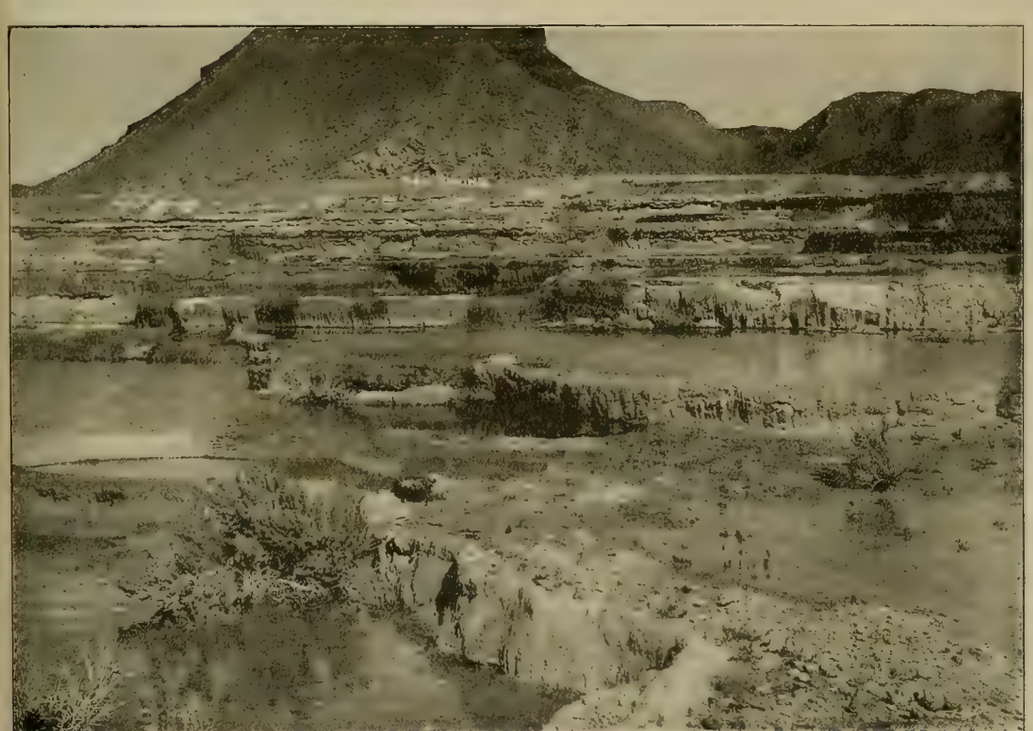
The State Engineer of Wyoming, Elwood Mead, in his last annual report gives an account of the hot springs along the Big Horn river in the Shoshone Indian reservation. The Big Horn hot springs have attractive surroundings, being situated in a mountainous and extremely picturesque region. The springs, of which there are a great number within a radius of half a mile, are at an altitude of about 4500 feet above sea level. Some of these well up from the bed of the Big Horn river, but the largest one is about 300 yards distant. The waters from this one fall over a precipice 40 feet high, reaching the river by a beautiful cascade. A fair idea of its volume can be formed by stating that it requires a rapidly running ditch 6 feet wide and 3 feet deep to carry the flow from this spring. Wherever it overflows the adjacent ground, it deposits its salts, notably those of lime and silica, causing the formation to look as white as snow. The country around is undoubtedly volcanic. Extinct craters, some of which are filled with water, are seen in the immediate neighborhood of the springs. These waters are rich with different salts. It abounds in sulphur, both in free sulphuretted hydrogen gas and in combination with lime and magnesium; it possesses a liberal amount of the alkaline salts of sulphate of magnesium and alkaline chlorides of sodium and potassium, and has in addition a great amount of the calcareous earths, such as carbonate of lime and silica. In addition, it has some ferrous oxide, and there is also present, when it bubbles up from the gorge, a considerable amount of carbonic gas which, however, escapes readily. The temperature of the water is 135 degrees Fahrenheit.



SECTION OF THE FORMATION, BIG HORN HOT SPRINGS.

The springs closely resemble in their different properties the famous European springs of Carlsbad, Marienbad, Ems, Teplitz and Aix-la-Chapelle.

The discharge of the springs last October was found to be 13.15 cubic feet per second, or 18,500,000 gallons per day. The original surroundings were beautiful, but as a result of interference with the natural flow of water and the depredations of specimen collectors, who have carried away large quantities of the most striking and peculiar of these formations, many of the pools are now dry and the surrounding walls are disintegrating into a crumbling, unsightly mass. Although on the Indian reservation these springs are far removed from the headquarters of the reservation authorities, but little attention is paid by them to the conduct of affairs. Being on a national reservation the civil authorities of the State can exercise no police supervision. It is to be hoped that so valuable a sanitarium may be placed under such control as will permit of its proper management. The illustrations are from photographs taken for Mr. Mead last October.



TERRACES AT THE BIG HORN HOT SPRINGS.

A New Coal Supply Reported.

A report from Hermosillo, Sonora, Mexico, is to the effect that extensive anthracite coal fields near there are about to be developed. It is further stated that Clarence King has pronounced this coal as good as any ever produced and that there is enough to supply the Pacific coast for years. This coast, and particularly California, possesses many advantages over all other parts of the Union, such as the climate which will enable all work to be conducted 365 days in the year; water power in torrential streams for generating electricity not equaled anywhere else, and a greater variety of raw material to be drawn from the farms, forests and mines of the State. Yet with all this, there has been one great drawback in the want of an abundant supply of good anthracite coal. If the report that comes from Mexico is true, it will mean much for the Pacific coast.

MINING AND SCIENTIFIC PRESS.

ESTABLISHED 1860.

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J. F. HALLORAN.....General Manager

TO THE PUBLIC.

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San Francisco, June 12, 1897.

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Local Capital for Mining.

In California less than in any other mining district in the world do the miners invest in shares in local mines sold in the open market, and in this particular direction Californians—and particularly San Franciscans—are doing very little for the development of the mining industry. The lesson they learned from the Comstock was to leave all mining shares alone. However, the Comstock mines were silver mines, in which the difference of formation allowed much greater latitude for purely speculative investment than do gold mines.

Miners on the Rand in South Africa invest in shares sold publicly. Miners in the Kootenay district, merchants and business men of Spokane and other cities in the neighborhood all take treasury shares in mines it is proposed to develop. So it is in and near all large mining districts of the world, with the exception of California. In San Francisco shares are never sold publicly in any mine in the State. Nor are shares sold in any of the mining towns of California in local mines, with the exception of Grass Valley and Nevada City. In Nevada City and Grass Valley, cities only four miles apart, with a combined population of over 20,000 inhabitants, the people are all miners, or dependent entirely upon mining for their incomes, and they have been ever since the mines were opened.

It is a custom there, and always has been, for the merchants, mine owners and even working miners to take shares in new properties and pay assessments until they are developed. In this way nearly all of the large mines of the district have been opened. The W. Y. O. D. mine was opened and developed by working miners who took their pay one-half in stock and one-half in money. So with the Pennsylvania. This mine is owned by working miners, merchants and others in the district who for many years paid assessments before there was any proof that they had a good property. A small 5-stamp mill worked what little ore they found from three stringers; and finally, after working to a considerable depth and paying out large sums of money, a large and rich mine has been opened up.

Such has, in a general way, been the history of many mines of the district, and it is safe to say that for the money expended probably better and more work has been done than in most mines opened up under different auspices. It is for this reason, to a great extent, that Nevada county to-day contains as prosperous a people as may be found anywhere in the world.

It might be well for miners of other districts in California to study the lesson to be learned in Nevada county. There are many mines throughout the State that might be opened by local capital, providing it could be induced to combine in this way. The store keepers, bankers, lawyers, public officials, all of whom are dependent entirely upon the prosperity of their respective districts, might well emulate the example set them in Nevada county. In Nevada a man who is not interested in some way directly in mining is an exception; but this is not the case in other counties.

Mining Location Boundaries.

If the owners of mining claims would, whenever they have complied with the requirements and are able to do so, obtain patents for them, they would remove a very fruitful source of litigation. There are very few mines located correctly. Proper surveying and accurate measurements are seldom made when mines are located. It has been proposed that the State Legislature enact that where a locator has the boundaries and corners of his claim established by a United States deputy mineral surveyor and his claim connected with a corner of the public survey, and incorporates in the record of the claim the field notes of such survey, that this will be sufficient to identify the claim. But even were such a provision made, very few would take advantage of it.

Considering the value of the property involved, less care has been taken in perfecting titles to mining claims than in anything else. Of course, the laws have been faulty and left much to the individual locator, and his carelessness has been the cause of an immense amount of litigation and confusion. Now that the new law as to locating mining claims has been adopted and that there is such a great increase in the number of claims being located all over the State, it becomes all the more important that great care should be exercised not only as to complying with the requirements as to the notices but particularly as to the fixing of the boundaries accurately. These should, wherever possible, be surveyed by a competent surveyor and tied up to Government monuments.

But until a patent is obtained the owner of the claim can never be certain of his title. In proportion to the number of mines located, there have been far less patents taken out in this State than in Colorado and Montana, where the value of patents seems to be much better appreciated.

During the week the United States Circuit Court of Appeals, sitting in San Francisco, affirmed the decision of the Circuit Court in the case of the Waterloo Mining Company v. Doe's Executors. In this case it was claimed that the company had lost the extra lateral right, because the end lines of its claim were not made parallel at the time of its location. It was shown that when patent was applied for, several years after location, that the Deputy United States Surveyor straightened this line at the time of the official survey by cutting off so much of the west end of the claim as was necessary to make that end line parallel with the eastern end line, and that patent had issued to the applicant in conformity with such survey. And the Court held that, as the patent gives the location parallel lines and grants the right to follow all lodes on their dip outside of the side lines of the same whose apex is within the surface lines of the claim, and whose strike is cut by the end lines of the claim extended perpendicularly downward, that the right of the mine owner must be determined by the terms of its patent.

"Looking, then, at the patent," says the Court, "we observe that appellant was granted extra lateral rights. If then appellant in entering the premises embraced within the lines of appellant's claim beneath the surface, followed down on its dip a lode whose apex was within its ground and whose strike was cut by the end lines of its claim as patented, it was pursuing a course to which it had a legal right."

This same question was substantially passed upon by the Supreme Court of the State of California in the case of Doe v. Sanger, who was the grantor of the Waterloo Company (83 Cal., 203), and there Mr. Justice McFarland said that a substantial compliance with Section 2320 of the Revised Statutes of the United States, requiring the end lines of each claim located upon a vein or lode to be parellel is all that is required. A location may be made in such an irregular and many sided shapes as to destroy the right to work the vein beyond the surface lines; (see Iron S. M. Co. v. Elgin M. Co., 118 U. S., 196, known as the "Horse-shoe case";) but the object of the statute is sufficiently met to sustain that right if the location is made lengthwise of the vein in a quadrangular shape, though the end lines are not exactly parallel; and the locator has a right, and perhaps it is his duty, within any reasonable time, to make the end lines parallel; if such change does not interfere with the substantial property rights of any other person. The purpose of the statute is to prevent a party from claiming more width of vein outside his surface lines than within them. "That the intention of the statute was to make the valuable rights of lode miners to depend upon things more substantial and important than the mere trick of a perfectly correct measurement of surface ground, or a mathematically correct survey."

The appellant was represented in the Circuit Court of Appeals by A. H. Ricketts and the appellee by John Garber.

Judge Ross and the Caminetti Act.

Judge Ross, in the United States Circuit Court last week, in the case of the United States against the North Bloomfield Gravel Mining Company, held that the Caminetti act was constitutional, and so construed the law that hydraulic miners will now know better where they stand in the matter. The action was to enjoin the company from carrying on hydraulic mining until it complied with the requirements of the Caminetti act. The complaint set forth that the company had failed to ask of the California Debris Commission a permit to carry on hydraulic mining, and that proper provision had not been taken to prevent the debris from being carried into the navigable streams below.

The defendants denied that debris from their mines impeded navigation and attacked the constitutionality of the Caminetti act. So the issues were broadly enough drawn.

Judge Ross upholds the constitutionality of the act and the right of the Commission to regulate hydraulic mining. In concluding his decision, he uses the following language:

So here Congress has created a commission under the direction of the Secretary of War and the supervision of the chief of engineers of the army to ascertain whether the various hydraulic mines within the territory drained by the Sacramento and San Joaquin river systems can be operated by impounding and other reservoirs without injury to those navigable waters; and if so the act of Congress permits them to be operated in such a prescribed way as will prevent any such injury. Until the matters of fact committed to the commission have been ascertained and the extent and methods of the work are prescribed the act of Congress prohibits the operation of any mine by the hydraulic process within the territory drained by the Sacramento and San Joaquin river systems from which any debris matter flows into those waters.

This, in my opinion, is the true construction of the act, and to it as thus construed I see no constitutional objection. It is too late now for any one to question the power on the part of Congress to declare that debris of any character, or other thing, constitutes an obstruction to the navigable waters within its control and to prohibit the use of such waters or other thing. The power to prevent absolutely the use of such waters for the objectionable purposes necessarily includes the power to prescribe the terms and conditions upon which they may be so used.

The provision of section 10 of the act, requiring the surrender to the United States of the right to regulate the manner in which the debris resulting from the working of such mine or mines shall be restrained and what amount shall be produced therefrom, only constitutes one of the conditions to such use required by Congress. As Congress already had that power of regulation it needed no conveyance from the mine owner to vest it. For this reason the insertion of that requirement by Congress as a condition to the granting of a patent to mine by the hydraulic process does not render the act obnoxious to any of the objections urged against it. A decree will be entered for the complainant as prayed for.

Concentrates.

A DISCOVERY of rich gravel is reported near Robinsonville, Oregon.

SEVERAL holes are to be bored to prospect for oil near Chino, California.

A COPPER LEDGE 4 feet wide has been located in Shasta valley, Siskiyou county, Cal.

SENATOR W. M. STEWART is endeavoring to have cyanide of potassium put on the free list.

AT the Kennedy mine, Amador Co., Cal., pay ore is being extracted at a depth of 2200 feet.

THE Boston & Montana Company is turning out over 3,000,000 pounds of electrolytic copper monthly.

THE Denver *Republican* estimates the output of Cripple Creek for May at 26,576 tons, valued at $1,082,780.

THE Boston & Montana Company has taken an option of purchase on the Anderson mine in Montana for $75,000.

THERE is unusual activity in the placers in the Virginia Dale district, in San Bernardino county, California.

A NEW mining stock exchange was opened for business in Los Angeles last Monday, and 62,000 shares handled.

TWELVE tributers have for seven weeks averaged $12 per day each in a drift in the Massachusetts Hill mine, Grass Valley, Cal.

FOR the first five months of 1897 the Le Roi mine at Rossland, B. C., shipped 17,056 tons of ore of an average value of about $70 per ton.

THE Palmer mountain tunnel, to be run 3000 feet to cut the leuges on that mountain, is in 300 feet and air compressor drills are being put in.

THE First National Bank of Helena, Montana, has commenced foreclosure proceedings against the Hope Company of Basin on its $75,000 mortgage.

THE International Gold Miners' Convention at Denver next month will be largely attended. The topics discussed will be practical and of general value.

THE county recorder received one day last week from Bingham district in Utah fifty location notices for filing and nearly all were made by one man.

TWO DREDGERS are being built near Park's Bar on the Yuba river to mine for gold. The capacity of each will be about 100 tons of material an hour, it is claimed.

THE Peruvian Government has discontinued the coinage of silver. All silver coins which have been exported are not allowed to return except as merchandise.

IT is estimated that there is in present circulation $1,500,000 in silver half dollars coined elsewhere than in the U. S. mints, of full weight and so well executed as to pass readily.

A DISCOVERY has been made of a large bed-vein of manganese near the line of the Union Pacific, in Utah, and arrangements are being made to ship 1000 tons per month.

PRESS DISPATCHES from Randsburg, Cal., announce that the Wedge mine has opened a 4½-foot body of ore, the counterpart of the strike made three weeks ago in the Kinyon mine.

A BOILER in the mill at the Oro Grande mine, in San Bernardino county, Cal., last Tuesday, killed one man, wounded several others and wrecked the plant. The loss is about $10,000.

RECEIVER W. W. STEWART reports refusal of the English offer of $750,000 for the Golden Cross M. Co.'s group of thirteen mines at Hedges, San Diego Co., Cal., $1,000,000 being the price asked.

THE U. S. Surveyor-General has awarded a contract for surveying the boundaries of the Yosemite grant. For the first time in this State on Government surveys cast-iron monuments will be used.

A PRESS dispatch from Phœnix, Arizona, announces that the Santa Locea group of mines near Dragoon Summit, owned by Bell & Stephens of Silver City, New Mexico, has been sold to St. Louis capitalists.

THERE were 413 new mineral locations filed for record in Nelson, B. C., from May 1st to 27th, inclusive. Calculated at fifty acres to a location, over 20,000 acres of land are represented by the filings.

IT has been reported by the United States Consul at Carthagena, United States of Colombia, that the coal fields of Bolivar are in extent over 200,000 acres, and contain anthracite and semi-anthracite of good quality.

GROUND has been purchased at Florence, Colo., for the site of a new reduction plant, to be built immediately, being the fifth ore reduction plant at Florence, with a smelter. Another reduction mill is under consideration.

THE recent decision of the Supreme Court of the United States in relation to tunnel rights has caused many people to locate tunnel rights in Colorado. In nearly every available place about Georgetown sites have been recorded.

THE management of the company which is to build a 350-ton smelter in the Seven Devils copper district in Idaho, state that it is their intention ultimately to construct a railroad from some point on the Union Pacific to the district.

THE gold deposits at the Denver, Colo., mint for the first five months of '98 aggregated $484,199.48. For the corresponding period of '97 the gold deposits there aggregated $3,739,848.27, which means a whole lot in and to Colorado.

SEVERAL capitalists at Los Angeles, California, are considering the subject of building a smelter at San Pedro if the harbor is constructed there. The nearest smelters now to southern California are at San Francisco and Pueblo, Colorado.

W. L. WATTS, field assistant of the State Mining Bureau, returned to San Luis Obispo from a six weeks' trip through the Sisquoc country, where he has been examining the bituminous deposits. These, he states, make the largest bituminous field yet discovered.

TWO SUBSCRIBERS—one in Baker City, Oregon, the other in Prescott, Arizona,—write simultaneously asking: "Are there any known cases where only part of a charge of giant powder has exploded, leaving a part of the charge intact, which was exploded later with another primer?"

MINERS have left for Gold Creek, in the Santiam district, Oregon, to try to locate mines which were worked by the Hudson Bay Company before Oregon became a State. Many prospectors have discovered remains of the work done at that time.

THE onyx mines near Prescott, Arizona, lately purchased by Congressman Fowler of New Jersey, are being investigated by experts, and it is announced that as soon as the proposed duty is placed upon that article by Congress a large force of men will be put to work.

THE English owners of the Bon Accord placer mine, near Bannock, Montana, are about to build a dredger to handle from 5000 to 6000 yards of gravel per day. It is claimed that the dredger in Grasshopper creek, near there, last year, has proved a success.

THE following item from the Grass Valley *Union* might well refer to mines in any part of the State: "The ledge recently struck at the California mine in God's country is said to be a good one. It is large in size and the owners expect to have a big mine up there."

IN Clear Creek county, Colorado, is a mine curiously named the Merryweather, at an altitude of 14,405 feet, on Irwin's peak and within 35 feet of the crest. It was located by a sailor. Another mine on King Solomon mountain, Colorado, is at an altitude of 14,000 feet.

THE exports of copper from the United States for the first five months of each year for some time has been as follows: 1894, 32,793 long tons; 1895, 25,615; 1896, 48,521; 1897, 49,509. The total deliveries in Europe for the first five months of 1897 amounted to 89,164 tons.

NEAR Leesburg, Idaho, the Summit Valley Placer Company has fifteen men working a dredging plant in Big creek, mining for stream tin. They obtain pebbles in size from small shot to hen's eggs, which assay 50 per cent tin and some gold. This is sent East to be smelted.

THE copper production of the United States for April is estimated at 17,454 long tons, an increase of 342 tons over April, 1896. The product for the first four months of 1897 is placed at 70,193 long tons, against 68,622 tons in the corresponding period of 1896, an increase of 1571 tons.

AT a meeting of the directors of the American Flat Development Company, in Virginia City, Nevada, last week, it transpired that few of the mine owners had consented to sign the agreement proposed. The Sutro Tunnel directors asked that a committee for a conference be appointed to meet in New York.

APPLICATIONS have been made to the California Debris Commission for permits to mine by the hydraulic process from Hoey & Lewis, for the Parsons claim, in Eldorado county; from the Morristown Mining Company, Sierra county; the Etta Company, and for the Mountain View claim, in Sierra City.

THE Great Northern Cripple Creek Tunnel and Transportation Company has been organized in Cripple Creek, Colo. The plans of the corporation contemplate a tunnel through Straub, Battle and Bull mountains. It is proposed to make it purely a transportation and drainage tunnel. The authorized capital stock is $5,000,000.

THE Dominion Government has agreed to the terms to be given the Canadian Pacific to build the Crow's Nest Pass road, and the company is making contracts and going ahead with the work. The construction of this road will do much toward building up the mining industry in the Fort Steele and other districts.

AT the Daly-West mine at Park City, Utah, twenty-five men were laid off last week, owing to increased railroad and smelter charges and price of powder. At Tintic the *Miner* says: "The local mining situation has not improved since our last issue, and the great reduction in the week's shipments is very noticeable in our report."

IN the Hidden Treasure drift mine, in Placer county, California, the main tunnel is now over 6000 feet in length, and with horse power it is difficult to handle the gravel fast enough. Harold T. Power, the superintendent, is arranging to construct an electric plant to run the cars in the mine, light it, and also run blowers, etc.

THE season now is more propititous for the myths of the Northwest than those of the South. The "Pegleg" will not be discovered again until late in the fall, when the prospectors wander southward again. Just now the "Lost Cabin," of Washington, Idaho and other parts of the Northwest is being sought for and occasionally discovered.

THE financial statement of the Anaconda Copper Mining Company of Butte, Montana, shows that the gross earnings of the company for the year ending May 30th were $17,375,000; the working and other expenses of production are given at $13,000,000, leaving $4,375,000 as the net proceeds of the year, an increase of over $1,000,000 over the net proceeds of last year.

AT the shareholders' meeting of the War Eagle Mine Co. at Toronto the financial statement of the Rossland, B. C., property for the four months ending April 30th showed the expenses to be $43,043.27, while the proceeds from ore sales were $40,635.20. The rates of freight and treatment now average $10 a ton, while the Crow's Nest Railway will reduce this at least $2.

COLORADO calculates that since '70 the cost of gold production in that State has fallen 80%. While gold can, according to that, be mined there for one-fifth the cost twenty-seven years ago, the refined product is to-day worth just what it was then—$20.67 per ounce. This is one of the reasons why in this west half of America gold mining is the most prominent and profitable present industry.

WORK has been stopped on three large properties in the Rossland district, B. C.—the Palo Alto, Monte Cristo and California—because the managers state mining stocks have generally gone down and they could not obtain enough for their treasury stock to warrant their selling. It is claimed by some that the mining stock exchanges have been the cause of the trouble more than anything else.

THE Silver City, Utah, *Star*, speaking of the present depression, says that it must shortly be overcome. "It is stated by people in a position to know that the former railroad rate will be restored. We are also advised that there is a man in Salt Lake who represents a syndicate looking for powder contracts, and if the principal mines of the State will make contracts for their powder, a factory will be started in Utah."

A PRESS DISPATCH announces the sale of the Black Diamond copper mine, ten miles from the Iron Mountain, in Shasta county, Cal., by Messrs. Kahny, Klaukens & Holden to Homer Wilson of San Francisco, representing New York capital, for $115,000. The mine is on the same lead as the Iron Mountain. The ore body, as far as prospected, shows a width at its narrowest point of over 250 feet, and is a mile and a half in length. The copper assays so far made do not run less than 7 per cent, it is claimed, with some gold and silver.

A DISPATCH from Gunnison, Colorado, says that last Tuesday a large body of sulphur in the Vulcan mine caught fire, by a miner dropping a candle, and a furious fire was raging underground. The smoke was also spreading to the Mammoth chimney, 400 feet away, and the men have been compelled to stop work. No one knows the extent of the sulphur, nor how long it may burn.

THE Iron Mountain Copper Company is producing 400 tons of copper matte per month, which is refined at the New Jersey Extraction Company's works at Elizabethport, N. J., most of the stock in which is owned by Mountain Copper people. As the total output of copper last year in California was a little less than two million pounds, with the work done by the Shasta Company this year's yield will be a very important item in the mineral output.

A SUIT involving the mines which Burcham, Singleton, Reddy and others own in Randsburg, Cal., has been brought in Los Angeles. The complaint was filed by the Rand Mountain Mining Company against the Sunlight Gold Mining Company, (C. A. Burcham, J. Singleton, P. Reddy, J. C. Campbell, W. H. Metson), claiming that, under contracts, they are entitled to an interest in the Rand, Olympus, Trilby, Singleton, Johannesburg and Desert View mines.

DURING May the Calumet and Hecla Company placed nearly 10,000,000 pounds of copper, while the total sold was about 20,000,000 pounds. In Europe the demand is considerably greater than it was last year. There is a notable increase in consumption in Germany especially, and that country is now apparently consuming more copper than France. England alone is, perhaps, using as much, if not more copper than the United States, while England, France and Germany together are estimated as consuming about 36,500,000 pounds per month, against estimates of about 15,000,000 pounds consumption per month in this country.

THE Hauraki Gold Mining Company paid 160 per cent dividend in 1896. The following figures are from their report for the year: Returns from sales of gold, £83,445; interest, etc., £1069; total, £84,514. Expenses in New Zealand, £25,325; expenses in London, £3065; dividends, £64,000; income tax on dividends, £2134; total, £94,524. The total amount of development work was 9593 feet, of which 129 feet was shaft sinking. The total ore treated was 4425 tons, yielding 27,121 ounces gold, or 6.25 ounces per ton. At the value given for the gold this was equivalent to 19,647 fine ounces. The total return was $91.77 per ton; total expenses, $30.89, leaving a profit of $60.88 per ton worked.

A CORRESPONDENT in Idaho asks the best method of cleaning quicksilver. Some put water on top and dissolve cyanide of potassium in it and then stir up the quicksilver. Concentrated lye or dilute sulphuric or nitric acid are often used. The best thing to do is to retort it if it becomes very foul. A method is given for cleaning where electricity may be obtained. Take a flat earthen vessel, pour sulphate of soda solution into it and lay a long strip of lead across it which can be bent in the center. Into this vessel place a semi-spherical, non-glazed earthenware basin, large enough to fit the bottom vessel, and into this pour the quicksilver with a little water. Put the positive wire in contact with the lead strip, and the negative wire with the quicksilver. The quicksilver will soon be brightened.

THE report of the Alaska-Mexican Gold Mining Company for the year ending December 31, 1896, shows that the total receipts from ore worked were $245,862; the expenses were $184,212, leaving a net balance of $61,650. Dividends paid were $72,000, or 8 per cent on the stock. Of the bullion obtained, $76,330 or about 31 per cent was from sulphurets collected by concentration and treated by chlorination. The total quantity of ore taken out and milled during the year was 101,702 tons, and 1290 tons of waste rock were removed. The total development work amounted to 2395 feet. The estimate of ore in sight at the end of the year is 607,266 tons, or over five years' supply for the mill. The cost per ton for mining and milling 101,702 tons was 181.12 cents, made up of the following items: Mining, 114.11; milling, 39.11; chlorination, 15.99; general expenses—Douglas Island, 5.59; San Francisco, 2.32; London, .58; Paris, .18; consulting engineer at San Francisco, .26; freight, insurance, and refining bullion, 2.68. The returns of bullion averaged 271.74 cents per ton, leaving a net average profit of 90.62 cents per ton. Wages were on an average a little higher than in California quartz mines.

UNDER the new Canadian tariff by an amendment which went into legal effect May 26, 1897, the following mining machinery goes into the Province free of duty: Pressure or exhaust fans, rotary pressure blowers, coal cutting machines (except percussion coal cutters), coal heading machines, coal augers and rotary coal drills, core drills, miners' safety lamps, coal washing machinery, coke making machinery, ore drying machinery, ore roasting machinery, electric or magnetic machines for separating or concentrating iron ores, blast furnace water jackets, converters for metallurgical processes in iron or copper, briquette making machines, ball grinding machines, copper plates (plated or not), machinery for extraction of precious metals by the chlorination or cyanide processes, monitors, giants and elevators for hydraulic mining, amalgam safes, automatic ore samplers, automatic feeders, jigs, classifiers, separators, retorts, buddles, vanners, mercury pumps, pyrometers, bullion furnaces, amalgam cleaners, gold mining slime tables, blast furnace blowing engines, wrought iron tubing, butt or lap welded, threaded or coupled or not, not less than 2½ inches diameter, when imported for use exclusively in mining, smelting, reducing or refining.

THE Executive Committee of the Gold Mining Convention, to meet in Denver, Colorado, next month, has made choice of the following as some of the questions to be discussed: The demands for a Federal Secretary of Mines and Mining; Federal and State legislation as affecting mines and mining; Federal and State statistics of mines and mining; Gold mining a safe proposition, gold value being established by law; The relation of gold and silver in mining the precious metals; Does gold and silver production keep pace with the increase of population and the demands of commerce? Can enough gold be mined to safely make it the only redemption metal money? The opening of Indian lands that have mineral deposits; Mineral lands and their development offer opportunity; Are the timber reservations and Federal game preserves injurious to the development of mining? Progress made by science and improved methods of saving the precious metals in the past twenty-five years; Hydraulic and placer mining; Does the known area and gold deposits of placers offer opportunity for profitable development? Railroad transportation and improvement of county wagon roads necessary for the increase and development of mining.

The Solution and Precipitation of the Cyanide of Gold.

Professor S. B. Christy's article on the above subject, published in the MINING AND SCIENTIFIC PRESS, has been the subject of world-wide discussion. The following is taken from the proceedings of the Chemical and Metallurgical Society of Johannesburg, South Africa, and read by H. T. Durant:

It has been pointed out to me that a discussion on the subject might be of some interest to the members of this society, its subject being so intimately connected with our work. Professor Christy, whilst noticing the earliest writers on the cyanide process, omits to mention the "Notes on Gold Extraction" written and published early in 1894 by our president, Mr. W. R. Feldtmann, and since extensively quoted, as in Scheidel's "Cyanide Process," p. 55, *et seq.* In the first section of the paper the solubility of gold in solutions of potassium cyanide is considered; the well-known equation of Elsner is proved, although previously verified by Maclaurin (J. C. S., 1893, vol. lxiii., p. 724), but at one time doubted by MacArthur and Louis Janin Jr. (Mineral Industry, 1892, pp. 262-263). This equation is too well known—at least in this country—to need repeating; it shows that under favorable conditions one atom of oxygen causes the solution of two atoms of gold, or, in other words, if oxygen were as soluble in dilute solutions as in water, one ton of a cyanide solution saturated with air contains enough oxygen to dissolve 6.9 troy ounces of gold, the theoretical strength of the solution actually required being .0155 per cent. This presupposes the absence of reducing substances, which, if present, must be specially considered. Whilst considering the supply of oxygen by chemical means, or the avoidance of its necessity, Professor Christy considers the use of cyanogen bromide. If the equation below put forward by Sulman and Teed is correct, then oxygen is not necessary for the solution of gold:

$$3KCN+2Au+CNBr=KBr+2(KCN, AuCN).$$

Great stress is laid on this means of obtaining "nascent cyanogen." It is not at first sight clear how this can be. Assume that cyanide bromide is added to a cyanide solution and the reaction is as stated in Sulman's equation, then cyanogen is liberated for the moment nascent, and, if in contact with gold, it can act at once by virtue of its nascent activity; but, if such contact is not the case, it immediately joins up into the molecule C_2N_2, and it is questionable whether molecular cyanogen is active under the conditions obtainable. In the treatment of tailings or ore generally it is difficult to imagine how it is possible to arrange matters so that the solution can be in contact with the tailings or ore at the moment the cyanogen group is liberated—unless, indeed, the reaction indicated by Sulman and Teed only goes slowly; but an ideal state is easily conceived in the treatment of slimes. Now, in the case of aqueous solution of potassium cyanide—or, in fact, of almost all salts—dissolution of KCN into its ions takes place in proportion to its dilution and other factors, so that any such solution really contains the KCN molecules dissociated into atoms of K and single CN groups, but charged respectively with enormous quantities of positive and negative electricity, so that the two ions do not under those conditions exhibit their characteristic molecular properties; but when on the one hand an electro-negative element like oxygen, and on the other hand an electro-positive element as gold, is present, the potassium unites with the oxygen and the gold with the cyanogen radicle. Referring to the weights of bromine, chlorine and oxygen, respectively, required to aid potassium cyanide in the solution of gold, the figures for bromine and oxygen are accidentally transposed. They should read:

(Sulman) 1 part by weight of bromine causes solution of 4.92 parts of gold by weight.

(Elsner) 1 part by weight of oxygen causes solution of 24.6 parts of gold by weight.

Dealing with the precipitation of gold from cyanide solutions, Professor Christy remarks on the extreme stability of (AuCN, KCN). Many who are here have perhaps at some time been aware of that. On acidifying a dilute solution of the above double salt, aurocyanhydric acid $HAu(CN)_2$ is probably present, and remains in solution. On concentrating, AuCN separates, and under less favorable conditions of concentration and temperature the aurous cyanide is decomposed. This is perfectly analogous to the behavior of $HAu(CN)_4$ and $HAuCl_4$. When dealing with solutions carrying only a few dwts. to the ton, it is extremely difficult to precipitate totally aurous cyanide either by double decomposition reactions—with the exception of silver nitrate—or as gold by reducing or oxidizing agents. Assuming that from such a dilute solution the gold were precipitated as such, it is highly probable that it would be in such a fine state of division that it could not be filtered out by ordinary methods, and, since salts which are absolutely insoluble are rare, it is doubtful if there is any gold salt which could be totally precipitated from solutions carrying such minute percentages of gold as is customarily met with. Barium sulphate, for example, is for ordinary purposes regarded as insoluble in cold water, and yet water dissolves at ordinary temperatures about .0043 per cent. I cannot find that the solubility or otherwise of aurous cyanide has been accurately determined, but it is commonly stated to be insoluble in water; if it were half as soluble as barium sulphate it would indicate that from a solution of $KAu(CN_2)$ about 12 dwts. of AuCN per ton would still remain in solution after decomposing the double cyanyde of gold and potassium by the addition of one of the various salts which answer that purpose.

Referring to regeneration of potassium cyanide from dilute solutions, Professor Christy mentions three methods. The first is his own, the second Professor de Wilde's, and the third is the subject of an American patent:

(*a*) Briefly, this method consists in acidifying the cyanide solution and steam distilling into caustic alkali.

There are two things mentioned which appear scarcely correct: (1) It is stated that a 1 per cent solution of potassium cyanide, when acidified, gives not the least apparent trace of escape of hydrocyanic acid. Such a solution contains .41 per cent of hydrocyanic acid. It would be difficult to say how dilute an aqueous solution of that acid must be not to be easily recognized by its odor, but certainly very many times more dilute than the above. (2) Novelty and utility are claimed for the above method. It certainly does not possess the former, and is open to much question as to whether, even if necessary, it could be profitably employed at works.

(*b*) Professor de Wilde's method consists in adding ferrous sulphate to the cyanide solution and obtaining a precipitate of ferrous cyanide.

At first the latter may be obtained, but the final result is a mixture of complex cyanides. This precipitate is presumably treated with acid, and the hydrocyanic acid recovered by caustic alkali. This process, like the first, can be worked experimentally, but the cyanogen radicle is not as easily recovered from complex cyanides as from simple ones.

(*c*) This is a method for a long time well known and consists of the precipitation of cyanogen radicle by the addition of zinc sulphate and subsequent recovery of the acid radicle from the zinc cyanide.

As regards its utility in work, I think this latter method is comparable with either *a* or *b*. Professor Christy has given much attention to the regeneration of potassium cyanide, but if that were even necessary it is questionable whether it could be done profitably in the case of very dilute solutions.

Precipitation of gold from $KAu(CN)_2$ by charcoal: The conclusion is arrived at by Professor Christy, as a result of his experiments, that "a given amount of charcoal has a definite capacity for precipitation," but no reason is given to account for this; there is little doubt that the carbon acts by virtue of its absorbed gases—the ones concerned are probably hydrogen, carbon monoxide and unsaturated hydrocarbons; there is evidence that these and the other gases existing in charcoal are in a state of peculiar activity. In the reference at my disposal I have not found the results of any accurate work on the use of charcoal for this purpose, the exact part it plays, and what follows after it ceases to act, if it does cease. Professor Christy gives details of an experiment in which in the presence of potassium cyanide a large percentage of the total gold is precipitated; towards the end of the trial the charcoal was apparently spent or nearly so, and free cyanide was still present to the extent of nearly 60 per cent of the original quantity; the question suggests itself if the charcoal finally ceases *entirely* to act and cyanide is present what prevents the gold going into solution again. It is scarcely possible that the charcoal can absorb the oxygen as fast as it goes into solution and so protect the gold. Dr. Keith (Rose's "Metallurgy of Gold," second edition, page 348) states that the gold in contact with finely divided charcoal in a solution of potassium cyanide goes into solution more rapidly than if no charcoal were present. His theory is the formation of gold-carbon couples, the electro-positive element being acted on by the KCN solution, and necessarily hydrogen would be evolved on the surface of the charcoal. Charcoal was used to reduce solutions of gold chloride probably for the first time nearly thirty years ago by Percy; according to Rose, it is under the disadvantage that it does not destroy the chlorine, which, therefore, is first expelled by heat or a current of air, to prevent the re-solution of the gold.

Precipitation of the $KAu(CN)_2$ by copper and its compounds: Professor Christy's experiments on the decomposition of the double cyanide by cuprous salts are of extreme interest, and, if there is total precipitation, with slight modifications, a new method for assaying gold solutions is suggested; but I fail to see its use, for instance, on a slimes plant dealing with more than a thousand tons of solution every twenty-four hours. The action of zinc chloride on the double cyanide of gold and potassium is similar to that of silver nitrate, cobalt nitrate and other salts, but considerably less efficient; and if the right conditions are obtained, zinc cyanide would be precipitated with gold cyanide. It is stated that when the zinc chloride is formed from the oxide and acid, a solution of zinc oxychloride is obtained; this latter salt is not appreciably soluble in water, so that the solution obtained must have been normal zinc chloride. Speaking generally, I think all the precipitation experiments have been done with solutions far too rich, losing thereby any practical interest which they might otherwise possess, as, if the amount not precipitated in any one experiment is a fairly constant quantity for any strength gold solutions, this amount looks small when expressed as a percentage of say 600 dwts. per ton solution; but the same quantity presents a different appearance when expressed as a percentage of a 1 dwt. per ton, solution. There is, of course, the possibility that when experimenting on a rich solution gold salts might be mechanically carried down by a bulky precipitate, thus giving conditions which are not obtained in operating on solutions of reasonable strength. In the final section of Professor Christy's paper reference is made to the constant tendency among cyanide workers to reduce the strength of their solutions. It is probable that even here those solutions which are now regarded "weak" will shortly be considered "strong," and, as a matter of fact, Professor Christy's forecast of the use of .01 per cent solution has for some time been more than realized at the Rand Central Ore Reduction Company's plant for treating Robinson slimes, where solutions containing only .008 per cent cyanide are successfully employed for dissolving the gold. Professor Christy also states that both the electrical zinc precipitation processes find in these dilute solutions their greatest difficulty, though this may be true as regards zinc, at the plant above referred to, where the Siemens-Halske process is employed, the precipitation is excellent and has in no way been affected by reduction in the strength of solution.

Suggestions as to River Dredging for Gold.

TO THE EDITOR:—In your issue No. 1921 of May 1st you have some remarks upon dredger mining that, while brief, indicate the general result in this field of operations. The experience in the Fraser and Quesnelle rivers is but a repetition of what has occurred in nearly every case of mining for subaqueous gold, the history of which reaches back at least twenty years on this coast.

The main impediment is no doubt one that you mention — the uncertainty of deposits in rapid streams. The Feather river is an example. People proceed on the theory that gravity will retain gold in the beds of torrential streams, but this is a mistake, graphically described by an old miner I met at Oroville some years ago, who, in speaking of the Pierce tunnel diversion scheme, said: "There is no gold in the bottom of Feather river. Why, if the rocks were all galvanized with gold they would be scoured clean every season."

There is however, outside of these rapid mountain streams, unlimited territory where the success of dredge mining is undoubtedly limited by the want of mechanical expedients and their proper management. For example, there may be no gold in Feather river worth seeking until this river reaches its debouchement into the level plain at Oroville, but certainly there are deposits of exceeding richness there that await the successful operation of dredging or other apparatus to raise the gravel from 40 to 60 feet below the water level.

That the gold is there is proved not only by the physical circumstances of the case, but by the fact that all the gravel or sand procurable at even a moderate depth, is panned out and pays; even in digging shallow wells the bottom material is rich, and Chinamen formerly worked in pits by diving under water to fill their pans with sand and gravel.

The precipitation of gold in any stream that flows through auriferous regions will take place when the waters reach a level grade, are spread out and lose their velocity. The Arroyo Seco mine in Amador county is an example, and there are dozens more that you can yourself recall.

In illustration of the failure of mechanical means for successful dredge mining, I will mention a parallel in the pneumatic caisson plant at Oroville, set on foot by the late L. L. Robinson about twelve years ago, intended to penetrate to the suballuvial deposits where the Feather river stills its waters and has shifted its bed within recent times.

This venture, which was based upon promises of the most logical kind, did not succeed for want of "evolution," so to speak. The air-compressing engines were taken from stock adapted to work at a pressure of 75 lbs. per inch instead of 20 lbs. required in the caisson, consequently were racked by speed to supply volume. The caisson was blown out for want of proper fastenings, and finally the water could not be expelled, for some reason not understood. Experts, including myself, were sent up to examine the plant, with the result that the company was disincorporated, the machinery sold and the whole scheme closed out.

I had the questionable honor of discovering, too late, the immediate or principal cause of the failure to expel the water, which was the depth of the heading in the drift. The tunnel or drift was in the bedrock and sloped upward from the caisson. This slope, with the height of the tunnel added, made a

pneumatic heading of about 10 feet, and a difference in air pressure at the top and bottom of about 4.3 lbs. per inch. When the air pressure was sufficient to expel the water at the bottom of this heading and slope, the pressure at the top was so much in excess of the water pressure that the air escaped in fissures faster than the engines could supply; the tendency for the escape of air being as the depth of what I have called the pneumatic heading.

Now, here was a case the same as in dredge mining: its success depending upon some simple conditions that were not foreseen and provided for. It is the same in all operations of a novel kind; the impediments are unforeseen and unprovided for.

I have prepared designs for a number of centrifugal pumps to be used for gold dredging, including one for the Murray river in Australia, and from conversation with a number of people interested in this matter I have formed the opinion that the main impediment to dredge mining is want of skill and the "evolution" which produces it.

The "boulders" offer great difficulty. One person's idea is to pass them through the pumps; another, to raise them by separate tackle or apparatus; a third, to move and stir but not raise them; all of which may be right or wrong, as the nature of the material and other circumstances may determine.

The circulation of average or common spoil by centrifugal pumps and means of extraction seem to be the only determined points of general application, and even these have to be widely modified. In the Murray river, where dredge mining has succeeded so far as to be continued for a number of years, the material was fine and boulders were not a serious impediment. The same plans would no doubt succeed in the alluvial reaches of our rivers or in the bay.

These plans, so far as I can learn, invoke machinery and apparatus of the best quality, designed and made by competent engineers, not for experiment but for "work," a feature wanting, so far as I have seen and been informed, in the ventures here.

I am conscious of not, in these remarks, imparting anything of much use to your readers, and, indeed, must assert skepticism respecting all methods of blind operating under water in the torrential rivers that flow from the Coast Range of mountains into the Pacific ocean; but I do believe that the resources of mechanical engineering are far from exhausted in respect to the deep deposits at the mouths of our rivers or where they enter the plains.

I always regretted the circumstance of not having a "try" at the Oroville scheme, and hope yet to some time have the privilege of tackling the problem under more favorable circumstances.

San Francisco, May 29th, '97. J. RICHARDS.

AT the recent burning of the Mexican International Railroad shop at Piedras Negras the superintendent saw that the building could not be saved, and instructed the fire department to throw no water on it, but to allow all the men available to shovel sand and earth upon the embers covering the fine machine tools. This precaution caused the metal to cool slowly. Few of the tools were warped, nearly all being put to work satisfactorily soon after the fire.

Practical Notes on Hydraulic Mining.*

NUMBER X.—CONCLUDED.

Written for the MINING AND SCIENTIFIC PRESS by GEORGE H. EVANS, C.E., M.E., General Manager Cons. G. Mines of Cal., Ld. Oroville, Cal.

It is well known by those who have gone into the efficiency of the hydraulic elevator that, unless the various parts are well proportioned, it is a most wasteful machine; but, as against this, the enormous amount of work they are capable of doing with a minimum cost for repairs and attendance, make them especially valuable for hydraulic mining, and, when constructed on proper lines, there is no difficulty in obtaining from 40 to 50 per cent efficiency from same.

In this country there are many instances where 10 per cent, and even less, is only obtained, which is partly due to the machine being wrongly constructed and a good deal to the fact that most of those at present using elevators, with few exceptions, do not know how to get the best work from them.

There are cases where superintendents of elevator claims appear to think that, as long as their machines can be made to handle boulders, in some cases 20 and 30 inches in diameter, that is a certain test of their efficiency. Such is not the case, as there is no difficulty in lifting stones double or treble the size, providing plenty of water and pressure be available.

To be successful in elevating auriferous deposits, unless exceedingly rich, one must make up their mind to use the smallest quantity of water, in both elevating jet and giants, so that the proportion of gravel or other auriferous material lifted in comparison with the water required for lifting and piping, will be of a maximum quantity. If this rule was followed by many of the present elevator claims, they would be lifting and treating, in many cases, three and four times the quantity of auriferous material they are now doing.

There are cases, of course, where it may be necessary for a short time in opening a claim to elevate the largest stones for the purpose of making room, but to continue such course is a great mistake—far better stack the larger stones in the paddock and use the extra quantity of water required for lifting such stones, in working a second or third elevator, and, in such manner, be treating three and four times more *pay dirt*, than working one heavy and wasteful machine to lift large boulders, etc.

Let any reader of this paper carefully work out the power there is in the water used through their elevator jet, then find out the power required to lift the weight of water used for elevating, plus the weight of the minimum quantity of necessary water for piping, and plus the weight of gravel or material sluiced and lifted by elevator; it will then be seen at a glance whether you are getting the proper work from the machine or not.

I know of an instance where a manager of an elevating claim in this State kicked because he was not getting 75 per cent from his head of water, when using a special form of water wheel, while he was using an elevator not yielding him 12 per cent in the same claim; it never occurred to him to try the efficiency of his elevator, as from the *appearance* of the huge quantity of water and the large and small rocks coming through the elevator, he was satisfied the efficiency could not be better. In some respects this was true, but the owners of the claim were paying him to lift auriferous material, not water and large stones, *occasionally* mixed with a few tons of pay dirt.

These machines are made in convenient pieces for mule transportation, so that where it is possible to take a mule there will be no difficulty in erecting and working an elevator. In connection with further particulars I may add that, through the editor of this valuable paper, I will be pleased at all times to answer any inquiries in connection with elevators, or, in fact, in connection with any mining work.

Grades and Sizes of Sluices.—There seems to be a great diversity of opinion, especially among the older miners, as to the size of sluices. Many of them stick to the idea that the best results are obtained from a narrow or deep form of sluice, and will try and make others believe that such a sluice is most easily kept in good running order. Now, this is not correct by any means, the reverse being the case, it having been conclusively proven by practical results that a wide sluice will carry more material, and save more gold, with considerable less grade, than a narrow and deep sluice.

It is a well-known fact in relation to gold saving that one of the first principles is to have as thin a film of water and material in the sluices as is possible, with, of course, due regard to the fact that there must be a sufficient depth of water to just cover the largest stones that are sent down the gold-saving sluices. I have noticed on more than one occasion when using narrow sluices that it takes much less time to cause a block than in wide ones, and when I state that I have worked sluices through ground containing nearly 10 per cent of titaniferous iron, or black sand, a good many miners will realize the difficulty in getting rid of from 2000 to 2400 tons of such a deposit per day, on a grade of 2 inches to 12 feet, and in doing this I soon found out the fallacy of using narrow and deep sluices.

With reference to the grade of sluices, experiments made in river gravel have shown that, with a grade of from 1 in 20 to 1 in 25, 40 miners' inches, or 60 cubic feet, per minute will wash from about 140 to 170 cubic yards per day of 24 hours, and with light grades the depth of water in sluices must be as shallow as possible, just so that it will move the largest stones and prevent the sand from packing. Mr. Gordon says that when there is a large proportion of heavy stones the best results are obtained by having about from 10 to 12 inches of depth of water in the sluice, this, of course, assuming that the large stones do not run over 10 to 12 inches in diameter.

In concluding this paper it is hardly necessary to remind the reader that the different formulæ are not original; but in several instances they have been simplified to meet the result of my own practical experience. The information and data, on the whole, are compiled from figures, formulæ, data and notes accumulated in my private pocket book, and if what has been written proves of the same assistance to any of my fellow miners or to those interested in mining as myself, I will feel amply repaid for the time taken in preparing this paper.

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WATERFALL, BIG HORN HOT SPRINGS. (*See page 493.*)

SOME experiments have been recently made with the object of ascertaining whether it would be possible to obtain a continuity in smelting metallic ores in the electric furnace in a similar way to the blast furnace. The slags from the ores are usually poor conductors, and their presence in the furnace entails the liability of the breaking of the current and a stop being put to the operation. Mr. Heibling, however, has succeeded, as it is stated in a Paris contemporary, in securing a slag which would be a good conductor, by using a flux consisting of a mixture of lime and carbon. This is, of course, the mixture used for calcic carbide. Under the action of the arc part of the carbon takes up the oxygen in the ore under treatment, while another part combines with the lime, forming carbides which are fusible and good conductors. The fused carbides take up and hold the infusible portions of the ore in suspension, while the metal settles at the bottom of the surface. The slag remaining is not worthless consisting of a carbide of calcium of great impurity, but not so much so as to be without a certain commercial value.—Industries.

A SETTLEMENT has taken place of long-standing difficulties between owners and claimants of the large copper properties in the Cananea mountains of Sonora, Mexico. The properties involved not only include the rich copper mines recently operated by the Cananea Copper Company and those formerly operated by the Sonora Copper Company, but also embraces the Cobre Grande and adjacent mines formerly operated by Gen. Pesqueira. At the Cobre Grande are ruins of old works in operation over a century ago.

THE Nobel Dynamite Company is considering the advisability of starting a powder factory in Denver, Colo. They propose to erect two or three factories in this country.

Mining Summary.

CALIFORNIA.

Amador.

Ledger: Underground development of the Argonaut is progressing in the mine, while a large force of mechanics are busy preparing for the placing of the machinery of the mill.

D. Gutmann has a bond on the Muldoon property and this week has some men at work.

The new hoist at the new shaft of the South Eureka is almost completed.

It will be several weeks yet before work is resumed at the Zeila.

A roller mill is being erected on the Robinson.

Republican: P. L. Shuman, owner of the North Star gravel mine near Mokelumne Hill and the Paragon group of mines near Railroad Flat, Calaveras county, is operating the Ulysses. He is driving a cross formation tunnel, cutting the three leads at 400 feet depth. The total length required to cut all the leads is 900 feet, of which 525 feet is complete.

The Bellweather closed down last Monday for, it is said, a period of two weeks.

The chlorination works at the Kennedy were started up last week. The machinery for this mine will be put in place this month. Work of sinking is going forward. The shaft will probably be sunk to a depth of 3000 feet in time.

The Zeila mine will put on a few men from time to time, but Mr. Detert states that the mill will not be started for several weeks.

Calaveras.

Ledger: The management of the Gwin mine has decided to reopen the old south shaft of that property and, when that is done, to sink a new shaft to the east. Plans are being perfected for the commencement of work very soon. The general idea now is to pipe their used water from their present works to the river, and either put in a large compressor and convey the power back to the works to operate the pump and hoist at the new works or put in an electric plant and operate them with electricity. Between the 1200 and 1300 levels in the stopes a streak of iron pyrites was encountered a few days ago which seems to be continuous.

The 4-stamp mill at the Juda mine in Spring gulch was completed last week. Water is the motive power for both mill and hoist, and the latter is of sufficient capacity to carry on work to a depth of 1000 feet.

Citizen: The Crown mine at Albany Flat is being equipped with new hoisting works.

On the Thorn crevice on San Antone creek another 8-inch pump was put in last week in order to cope with the water. There are now two 8-inch pumps at work night and day. The gravel that has been taken out so far prospects well.

Kern.

Randsburg *Miner*: The Val Verde has put on more men and is now producing pay ore.

There are about twenty men working on the Rand mine.

Good progress is being made on the shaft of the Butte.

A recent run of seven tons and 600 pounds of ore form the W. J. Bryan mine, owned by Montgomery Bros., produced $800.

The King Solomon people are taking out good ore at a depth of about 300 feet.

The Little Butte's No. 1 shaft is down 135 feet, and they are drifting south to strike the ledge, which they hope to do within a week or so.

The Alameda is growing richer as greater depth is attained,

The owners of the Wedge are still pushing work on their shaft. They will be down 415 feet within a week or so, when the new power hoist will be placed in position and sinking to a depth of 1000 feet continued.

Mariposa.

(Special Correspondence).—The Merced Gold Mining Co.'s 40-stamp mill has been entirely overhauled and put in better order than when first built. The last ten stamps were unlatched on May 29th. One-half the stamps are running on ore from the Melvina mine, large quantities of which were left broken in the chutes and stopes by the old management, and the rest are running on ore from the Mary Harrison, which is brought to the mill in three-ton cars over a new gravity railway 3½ miles long. The mill is handling about 100 tons in twenty-four hours. The Bigelow shaft has reached a depth of 1000 feet vertical, and on completion of the sump a station will be cut at that point. As the shaft passed through the vein at the 950 level, but a short crosscut will be required to cut the ledge. Work on the Nelson shaft at the Louisa mine has been suspended indefinitely, the pumps pulled and the engine dismantled. It is said no ore that could be profitably milled with the present plant was uncovered on the mine. The company's dam on Black creek, which was partially wrecked during the winter floods, has been repaired, and the storage reservoir has been nearly filled by the construction of a ditch from Maxwell creek. This insures water for milling purposes till late in the summer.

Nothing is being done on the Penon Blanco property, which is reported as under bond; but it is understood that work will be begun there on a large scale some time during June.

The Virginia mine is being worked under bond to the California Exploration Co. Two shafts have been sunk to depths respectively of 50 and 90 feet on good bodies of ore, the old tunnels have been cleared out and the old incline shaft reopened to the 400-foot level, where drifting is now in progress. All reports on the property are very favorable.

At the Bully Hill mine, in the McAlpine district, some eight men are prospecting along the ledge.

George Treadwell and F. H. Hill have bonded the Porter Ranch property comprising about 350 acres along the west vein, about two miles south of Coulterville. A few men are already at work preparing for development work with a larger force.

Work progresses on the Bunker Hill with the usual force, considerable surface improvements are being made and a mill will be placed on the property during the summer.

At the Red Banks no progress is being made in the mines, and only enough men to keep the workings in order are employed.

The Louisiana, which was closed during the winter on account of bad roads and scarcity of fuel, will resume operations in a few days. A small prospecting mill will be erected at once.

The Bondurant, which shut down for a month to install a boiler and air compressor, is again working on the crosscut tunnel which will cut the vein 800 feet vertically below the collar of the old shaft. The tunnel is now under to a distance of 400 feet, and it is expected to tap the vein in about 100 feet more, when drifting will begin.

At the Burton, near the Louisiana, the 2-stamp mill is running and bullion shipments are being regularly made. This is the only quartz mine in the district where the employment of Chinese is countenanced.

The Fair View mine, near the preceding, has been bonded to ex-Governor Van Armin of Arizona, and Supt. Anthony is putting down an incline shaft on the ledge.

At the Contention drifting still progresses on the 200 level in a good grade of milling ore.

The Blue Lead, on Bull creek, has been sold by A. Bertanni to Gov. Blaisdell and others and will be reopened.

Hedges and Koenig are working the old Hilliard mine, on the head of Bull creek, and taking out considerable quantities of high-grade ore, which is worked in an arrastra at the mine.

Coulterville, Cal., June 6, '97.

Placer.

Sentinel: At the Horse Shoe Bar Consolidated mine, four miles below Michigan Bluff, on the middle fork of the American river, the hydraulic elevators have been started and sinking to bedrock commenced. They are run under a head of 400 feet pressure. The suction pipes, of which there are two to each elevator, draws up sand and gravel to the size of 7 inches, as well as the water which is used to sluice the material to the pumps.

A tunnel 35 feet wide and 12 feet high has been cut through solid slate rock for a distance of 200 feet, which drains the loop, or horseshoe, for over a mile of channel. A flume and ditch, carrying 1200 inches of water, which required half a million feet of lumber, was run over some of the most precipitous parts of the country and gained them a free water right.

At Sunny South the Hidden Treasure Company have ceased breasting gravel and about twenty men are working on tribute.

About seventy-five men are employed by the Hidden Treasure Company at their works at Centerville.

At the Blue Canyon Mining and Development Company property work has been discontinued on the big tunnel, preparatory to putting in power drills.

W. Rabin has eight men in his Bartley drift gravel mine at Dutch Flat. The main tunnel is now in 800 feet and a crosscut of 310 feet has been made, which opens up a large body of good wash gravel.

The Glen Consolidated Company have six men at work at the mine above Forest Hill.

Plumas.

National-Bulletin: Shinn and Perkins have returned from Granite basin, where they have secured a bond on a mine owned by Mrs. Christie, and will develop it. This mine has yielded some rich ore.

Superintendent Challen is pushing work on the Topaz-Centennial.

At the Robinson mine the shaft is 100 feet deep. The Chicago capitalists who have the mine bonded are preparing to drift from the bottom.

Nevada.

Telegraph: The Pennsylvania mine is looking well and in a very short time great improvements will be made at the works. The mill will be run by electricity, the machinery for that purpose having already arrived. Besides this the company will soon add five or ten stamps to the mill

At the Brunswick mine the water is being lowered fast and Superintendent Chris. Mallon states that they now have it lowered to near the 700 level within the past three days.

Transcript: A new and larger hoisting plant is to be erected on the Home mine, Deer creek. Pumping and other machinery will be put in and a new two-compartment shaft sunk, to which raises will be made from the present underground workings.

A strike has been made in the old Hirschman gravel mine west of Grass Valley. The tunnel is several hundred feet long. The channel is the continuation of the old Live Oak, Nebraska and Manzanita gravel channel.

Union: In the Live Yankee gravel mine at Graniteville a fine body of gravel has been encountered, which has the appearance of growing in richness as progress is made. The mine is being operated by about twenty citizens of Graniteville and North Bloomfield.

The Gray Eagle mine near Maybert is in good rock and a crushing recently made yielded $16 to the ton. Tiernan & Richards own the mine.

Shasta.

Free Press: H. L. Shannon is developing the Keystone and Peach Orchard on Flat creek. He has run a crosscut tunnel 240 feet on the last named property, but has yet 60 feet to run before reaching the ledge. He also has a drift in 140 feet on the ledge, and during the month intends extending it 60 feet.

A side track will be put in on the line of the Southern Pacific Company a half mile north of Keswick station. A short tramway will be built from the mine to the side track and the shipping of the ore to the smelter of the Mountain Copper Company will be commenced.

At Harrison gulch the Roberts Company has men employed overhauling the mill, and an additional force has been put to work in the mine. A cyanide plant is being put in at the mill.

Searchlight: The Mountain Copper Co. have their 300 H. P. engine about in position. They have let a contract for the erection of forty more cottages. This will make fifty-three in all.

The Mammoth Garfield mine at Old Diggings has resumed work. The company, of which S. Cheney is the controlling stockholder, have contracted to furnish the Mountain Copper Company with thirty tons of ore or more daily. The ore will be conducted to the S. P. railroad by ropeway, and from there to the smelters by rail.

At Harrison Gulch the Gold Hill ledge has been struck in the crosscut at a depth of 300 feet. The size of the ledge is about 5 feet and the quartz is of the same character as the Lucky Baldwin. The owners immediately increased the working force of miners, who are now extracting ore and doing more development work.

Mr. Senn during the past week purchased the Delta quartz mine from M. D. Butler & Son. This mine is located five miles north of Delta. Mr. Senn has also secured possession of the Gold Standard group, near by, and now virtually owns the whole of Treasury hill. Active operations will at once be commenced in the way of sinking, putting up mill plants and erecting reduction works.

Sierra.

(Special Correspondence).—To the observing stranger that comes to this place it seems at first glance wonderful why more mines are not in operation. Even the stately buildings which five years ago were the abode of 300 busy miners in the employ of the Sierra Buttes Company no longer resound to labor's busy hammer. But upon inquiry I learn that the prospects are promising for the reopening of the entire plant.

There are several other properties which were the scenes of activity and they, too, are idle. But the day is not far distant when capital will come to the rescue and redeem these storehouses of wealth from their present condition. Better management, improved mining and milling methods will all be important factors in reopening some of the properties.

The permanent, abundant and cheap water power available makes it possible to operate not only power drills, which have not yet been put in use here, and the facilities for compressed air offer probably nowhere so good a field as here.

The formation is such as mining men desire. The ore bodies are of fair size and value. Roads are good and climate is charming. Prices and opportunities for obtaining working bonds are quite reasonable and favorable. Sierra City is but fifty-eight miles from Nevada City and is easily reached in a day's travel over one of the best stage lines in California. J. F. L.

Sierra City, June 7, '97.

Mountain Messenger: The Gibraltar Mining Company has commenced operations again.

P. Doray is working a number of men on Wallace creek.

D. Corbett has started up his mine at the Slate creek house.

The Garnett Mining Company is working with full crews at its mines at Hepsidam and Bunker Hill.

The Liberator Company is running the main tunnel on its claim at Deadwood with two shifts. Gravel is expected in about 100 feet.

Siskiyou.

Reporter: A quartz ledge 5 feet in width and carrying a 36-inch pay streak has been opened up at the American mine in Deadwood district.

E. Sheffield is working the Osceda mine. Under the same location the development shows two ledges 90 feet apart, 10 and 12 feet wide respectively.

T. Tempest is building an arrastra on the Midwinter mine.

The Salmon River Mining Company have abandoned work at their present place of operations and have decided to open up Robinson Flat.

News: Men are employed at the Morrison mine in Quartz valley making room for a larger force and will soon begin extracting ore. The mill is being fitted up to crush custom rock.

Sovy and Vincent have leased the Nebraska mine on Cherry creek and have had a small crushing of ore in the Barnes arrastra. The result was satisfactory.

C. Sears is working his mine on main Hungry creek with good success.

Richey & Letner, who have been working on the Prosperity mine, on the blue gravel deposit in Salmon River district, have recently constructed a light 1-stamp mill.

There is now a possibility that the Sterling quartz mine, on a tributary to Hungry creek, will be started up. The mine has been idle for two years on account of the inability of the owners to put in the necessary machinery.

Journal: The most promising reports come from the different mining sections of our county this season, and Siskiyou's gold product should be larger this year than ever.

The Klamath River Flume and Mining Company have started nearly all of their freight down the river. The machinery will soon be in place after it is on the ground. This will be the most extensive plant in the county when in operation, and a large tract of land is to be mined.

Journal: On the Klamath river the Distlehorst-Barton dredger is doing splendidly below Oak Bar, where they have been working for some time. The dredger handles a large amount of gravel, and it does not require very rich ground to pay well.

Sovey and Vincent, who have the Nebraska mine on Cherry creek leased for five years, have ten tons of ore out which they are crushing in the arrastra.

C. Casedy has been having some ore crushed at Lamb's mill in this place, taken from his ledge, west of Yreka. The rock averaged well, and work will be continued.

No sale of the Mabel quartz ledge, on the divide between Oak Bar and Scott Bar, has been made yet, although it is expected that one will soon be.

The Columbia ledge which adjoins the Mabel mine has been producing a large quantity of ore this year, but at present not much work is being done.

Trinity.

Free Press: The Altoona Company has three huge steam pumps running steadily night and day pumping the water out of the mine. At the present rate it is estimated that it will require from fifteen to twenty days to free the mine of the water. The inflow is very irregular. In one day the water was reduced 17 feet and on the following day gained 6 feet upon the level of the previous day, notwithstanding the pumps were running constantly. The flooding of the mine has been a loss to the company of over $40,000. As soon as the mine is in proper shape, the company will resume mining on a larger scale than ever before.

Tuolumne.

Democratic Banner: The Black Oak Company is adding ten stamps and making other improvements.

It is said that the Parole, which has been idle, will soon resume operations.

At the Keltz the company has placed in new concentrators and other machinery.

Wm. Sharwood has a force of men developing the old Grizzly, which has been idle for some years.

Some rich ore has been taken out of the Golden Dawn, near the Junction, which is owned by John and R. A. Nicholls.

Work on the Junction, under the management of Mr. Storms, is being pushed rapidly.

Wm. Floyd is trying to arrange with a company to open up the Easterbrook mine near the Hazel Dell and Evans.

NEVADA.

LINCOLN COUNTY.

S. T. Godbe of Bullionville has sold a part of the old Raymond & Ely tailings to Peck Bros., who will work them by the centrifugal process.

Pioche *Record*: The Magnolia mine is working its usual force of men, and is opening up some fine ore bodies which are being blocked out.

The Smith Bros. are working a small force on the Oro mine, which is improving as depth is attained.

Development work on a large number of promising claims situated near De Lamar is being pushed with vigor. Several of them are good milling propositions, but rock that is rich enough to ship to market is not so plentiful, it requiring ore that will reach the hundreds to ship to advantage.

Walker Lake *Bulletin*: At Silver Peak the men who were experting the Blair property have finished their work.

In the Mary tunnel the ledge carries 6 feet of first-class ore. There is room now for more men and stoping will begin in a day or two. The dump is full of ore.

At Gold Mountain they have found a good streak of very rich rock in the old Oriental.

Silver State: Near Lovelock, in Trinity district, within the past year T. Ellsworth of San Francisco, who was the original locator and organizer of the Evening Star Company in 1862, purchased the mine, and is now, in conjunction with others, following up the work where left off. They are developing the upper workings by drifts and tunnels, one of which is 364 feet in length, to tap the original shaft and drain the mine to this point.

Dayton *Times*: At Pumpkin Hollow W. T. Warren in the Lottie has a well defined ledge, about 16 inches in width.

Pratt and Martindale are still sinking on their claim; the shaft is down 84 feet; ledge is good and strong and about three feet in width.

On the Irma Faye mine, owned by L. W. Stark, he has a shaft down about 34 feet and a good strong ledge in the bottom.

M. Pritchard has commenced to sink a shaft on the first south extension of the Lookout mine, and is taking out some good rock.

Central Nevadan: The coal mines in Crum Canyon near Battle Mountain are developing into a very important factor for the future of this section. The coal is first class, now being used for blacksmithing and fuel purposes. A 7-foot vein is now in the shaft.

The Nevada Reduction Company are working old Pittsburg tailings.

Morning Star has a large force of men in the mine and their 10-stamp mill is kept running day and night.

D. Finn is producing good ore at Webber canyon.

Copper canyon under managoment of a Salt Lake company is making regular shipments of copper.

The Gold King Mining Company near Galena are driving a tunnel to cut the ledge at the bottom of Prospect shaft which shows a rich gold ledge in the shaft.

The gold mines adjoining Gold King, the property of Dr. Emerson, is being opened under the management of Supt. F. E. Chagnon.

Buena Vista mines, Galena property of John Mellander, is now producing large quantities of high grade gold and silver ore.

OREGON.

Rogue River *Courier*: Slate creek and Deer creek are the only streams in Josephine county where no mining is done.

Crow & Taylor are packing some 1500 pounds of ore daily out from their Galice creek mine and caching it at Mr. Crow's place preparatory to hauling it by wagon to Merlin.

Medford *Mail*: Rich diggings have been

reported on Silver creek that pay $15 per man. This creek was famous in the early days and at one time furnished employment to several hundred men.

Utilizing the water of Rogue river for mining is becoming more general. Trefern & Snowgoose are now putting in a pumping plant near Grant's Pass. There are many acres of placer ground along the banks of the Rogue which can in no other way be worked than by means of pumping plants, but these plants to be made profitable must be constructed with the object of cheapness in operating. Several plants of this nature already put in are too costly in operating. A floating water wheel for this purpose has been suggested as possible and economical.

Jacksonville *Times*: The Shorty-Hope Mining Company of Ashland district are advertising for bids for the construction of 375 rods of ditch at their mine.

The Portland parties who have leased the Braden mine, in Gold Hill district, have a force of men at work getting out ore, and will start the mill in a few days.

J. Chapman has sold his mining claim on Applegate to S. Cole of Medford.

S. T. Call, of Calvert & Call, has sold his interest in their hydraulic mine in Pleasant creek district to J. D. Stevens of Jacksonville.

BRITISH COLUMBIA.

The following are returns of the product of the mines of the Kootenay country for 1897 up to May 29:

ORE EXPORTED.

	Tons.
From Slocan via Kaslo	10,841¼
Slocan via Nakusp	2,642¼
Rossland via Northport	6,891¼
Rossland via Nelson	52
Total	20,445¼

	Value.
Through Nelson Custom House	$1,197,665.41
Through Revelstoke (Nakusp)	292,110.65
Total	$1,489,776.06
Average value per ton	$72.866

PRODUCE OF SMELTERS.

	Tons.
Nelson (Hull Mines) Matte	582
Trail Smelter Matte	2,843¼
Total	3,425¼
Total value	$1,534,462 98
Total value of ore and matte exported	$3,024,239.04

Spokesman-Review: In the Slocan the Ruth has thirty carloads broken down and sorted, and is waiting for good roads.

The Slocan Star is preparing to cut the fifth level. The fourth level has been run about 900 feet, and they expect to reach the ore in a few days. The fifth level tunnel will run fully 2000 feet to reach the ore body.

The Reco, heretofore a winter shipper, has contracted for ore to be taken out on pack trains until their tramway is finished.

A 6-inch vein of galena has been struck in the St. Keverne, adjoining the Payne group, in the Slocan. The strike was made in the crosscut at a depth of 218 feet.

The Payne mines in the Slocan are soon to have a tramway, surveyors being engaged on the preliminary work. The elevation will be about 2000 feet.

The Le Roi has made another rich strike at a depth of 570 feet in the shaft. The War Eagle is now in the best kind of ore, and the leading mines generally never had better showings than they have to-day.

A group of claims above the O. K. called the Bean Pot, are turning out well. They have made a crosscut to the 100-foot level and have 16 feet of solid ore.

The final cash payment has been made on the Sullivan group. This property, which includes the Hope, Hamlet and Shylock claims, near the North Star mine, in the Fort Steele country, is owned by the Sullivan Group Mining Company, which have set men to sinking, building a wagon road and erecting buildings. A report from the mine says they are sinking on fine ore. It is a silver-lead proposition. The company is considering the building of a steamer to transport its own ores and supplies.

At Silverton in the Galena Farm in laying pipes for water and within a 500 feet of the working shaft a body of high-grade galena was uncovered 30 feet in width, averaging, it is said, 200 ounces of silver.

Rosslander: A strike has been made on the Sunset No. 2. A ledge of copper ore had been traced for a distance of 100 feet, maintaining a width of from 10 to 14 inches. Last week the vein widened to 18 inches and is still solid copper ore.

W. L. Parrish has sold his quarter interest in the Pine Rine Gold Mining Company, owning mineral claims at Deer Park, to J. B. McArthur for $3000.

Rossland *Miner:* At Salmo on the Nelly Bly the owners have struck an 8-foot ledge of solid ore which shows free gold. A wagon road will soon be put in to the property and shipping will commence in a few weeks.

Boyd & Hamill on the Arlington have a ledge from 40 to 100 feet wide and can be traced the full length of three claims. The company has three shafts and eleven open cuts on it now, and a wagon road will be built at once in order to put the machinery in which the company has already ordered. This is a free gold proposition.

The Donaldson Mining Company has resumed work on the Johannesburg with a large crew of men. They are also working a crew on the Erne.

The Red Mountain Company started a long crosscut tunnel several months ago. This was driven 470 feet when a ledge was cut carrying some very pretty ore. Another ore body averaging from 1 to 2 feet in width has been found. This ore is high in copper and resembles very much the ore found in the shaft which is sunk on the main or north vein.

Spokane *Chronicle*: There is a deal on foot for the purchase of the White Water mine in the Slocan country for $500,000.

The last payment of $13,000 has been paid on the Argo and Belt mineral claims, by the Argo Mines of Sandon. A force of men has been put to work developing the property.

A bond of $25,000 has been obtained by Messrs. Leighton on the Evening Star and Keystone mines.

At Fairview the owners of the Tinhorn are bringing in a 20-stamp mill to work the ore taken from the property.

ALASKA.

Miner: Placer mining has commenced at the Basin. The season is two weeks ahead of last year. The Nowell Gold Mining Company has a force of men at work at their placers, and they will shortly be in full swing there. The Basin will be the scene of much activity this season. The Juneau Alaska Company will conduct extensive operations, and the Ebner mill will be running to its full capacity.

At Berners Bay the Comet mill of the Berners Bay Mining and Milling Company is dropping thirty stamps. The ore bodies are large and the outlook encouraging. In a few days ten more stamps will be in operation at this mill.

From Bostwick Inlet to Dall Head the whole of Gravina island has been the scene of prospecting for the past three months.

UTAH.

Bingham *Bulletin*: Following are the shipments in tons from Bingham for the month ending May 31st: Old Jordan & Galena, 1400; Northern Chief, 50; Tiawaukee, 20; Neptune, 25; Burning Moscow, 22; Highland Boy, 86; Live Pine, 25; Utah, 40; Black Hawk, 50; Old Telegraph, 697; Phœnix, 100; Stewart No. 2, 20; York, 50; Last Chance, 50; Niagara, 25; Summit, 26; Julia Dean and leases, 18; Dalton & Lark, 420; Sampson, 25; Fortune, 200; Revere, 50; all other sources, 100; total tons, 3599.

Tintic *Miner*: It is to be noted that the feeling of depression is growing less general and that local business has a healthy aspect. The shutting down of the Mammoth mill has, of course, thrown a considerable number of men out of employment, while the Ajax has also made its expected draft. During the past week a total of about 125 men in the district have lost their positions. As to the railroad and smelter situation, which is the cause of all the trouble, there seems to be a general feeling that the difficulty will be righted, which accounts for the cheerful aspect as compared to last week. It is rumored that the mining companies have succeeded in impressing upon the railroad and smelter combine the necessity of returning to old rates if their business is to be continued, and that an adjustment will probably follow in the course of a week or two. It is also reported that arrangements will probably be made at the June meeting of the Mammoth directors to again resume operations at the Mammoth mill.

Shipments from the district for the week are as follows: From the Bullion-Beck mine, 17 carloads ore; Centennial Eureka, 5 carloads ore; Eureka Hill mill, 7 carloads concentrates; Uncle Sam, 6 carloads ore; Ajax, 5 carloads ore; Swansea, 4 carloads ore; South Swansea, 6 carloads ore; Northern Spy, 1 carload ore; Morning Glory, 1 carload ore; Grand Central, 1 carload ore.

Supt. Green of the Buckeye reports a new strike made Wednesday in the bottom of the shaft in that property. The ore showed 3 feet wide.

Supt. McChrystal reports that considerable shipping ore is being encountered in the Eagle mine in the course of development, together with a great deal of ore of a good milling grade.

The Snowflake Mining Company is advertising for bids to sink the shaft in that property 100 feet deeper. The shaft is now down nearly 200 feet.

The Buckeye commenced sinking this week from the 350 level, and will send the shaft down to the 450 level. A shipment of ore will go out in a few days.

Mercur *Mercury*: On the Gold Point the shaft is now down over 200 feet.

A force of men has been put to work this week on the South Daisy, owned practically by the same company as the Daisy.

At Stockton the Hercules mine is shipping a sixty-ton lot of first-class ore. The shaft is down 200 feet, and the ore body at that point appears to be a better grade and a larger body than it was at the 150-foot level, where it was first encountered.

E. P. Mitchner & Co., owners of the Yellow Metal group of mines, between Stockton and Dry canyon, have let a contract to sink a 50-foot shaft on the silver vein, also a contract to run a 100-foot tunnel on the gold vein on the same property.

Mercur *Miner*: At the Brickyard it is believed that the ore body is a continuation of the vein of the Geyser, but the ore is of a little different character. There are two veins each of about 15 feet in thickness. There is already blocked out a body of ore 200x225 feet. If we take the usual estimate of a ton to 14 cubic feet, it will be seen that there is already about 100,000 tons blocked out. It is the intention to continue drifting so that probably 200,000 tons will be blocked out by the time the mill is ready for operation.

Silver City *Star*: The work of sinking the main shaft of the Buckeye was commenced last week and an additional 100 feet will be sunk. The shaft is now about 350 feet deep and when the 400 level is reached a station will probably be cut.

Park City *Record*: On the Constellation very little work is being done on the surface, the management confining its energies to driving the crosscut from the 300 level to tap the gold-bearing ledge.

IDAHO.

Spokesman-Review: At Wallace the Sunset Peak Development Company has bonded the Ula and Try Me for $50,000 and commenced work.

Spokesman-Review: The Tiger-Poorman mine at Burke, in the Cœur d'Alenes, shipped 1980 tons of concentrates for the twenty-seven working days in May. Its new plant is believed to be the biggest single concentrater plant on the Pacific coast. They are hoisting 400 tons of ore daily from the 1100-foot level. One hundred and fifty men are employed, and the mine and mill are working night and day. The monthly expenditures are about $27,000, and the average wages are $3.72 per day. In the mine development work is well ahead. They are still sinking on the main shaft, which is now down 1200 feet, with a 14-foot ore body.

On Lake Pend d'Oreille the Keep Cool mine is making regular shipments, running as high as 100 tons a week, which pays a heavy dividend after allowing for all improvements that are being made and the regular running expenses. A new concentrater is nearly completed.

The Weber mines are not being operated at present, but parties interested have been making an examination of the property during the last month with a view of resuming work.

On the Bunker Hill-Sullivan, at Wardner, the management is now running one and a third miles into the mountain, which will give a depth of 750 feet. This tunnel when completed will relieve the mine of the use of its tramway. The tunnel will also drain the mine and stop pumping. The mine has a 40-foot ore body, and employs between 400 and 450 men.

Spokane *Chronicle*: At Elk City the Howe mine—bought by G. C. Howe of Duluth last fall, he paying $50,000 for a half interest—has a ledge 4 feet wide which is spread over the hill like a blanket, the development work having so far failed to show where the ledge goes down into the ground. The mill is now en route to the mines to work the ore.

In placer the American and Buffalo Hill companies are running all the year round, as they have plenty of water and are making big cleanups. The Gold Hill, owned by Eaves, Knepper and other Lewistonians, is about to run, the machinery being on the way. A Tacoma company is building seven miles of ditch on Crooked river to open the McEntee property. F. Smith is tunneling the hill across a bend in the Newsome creek, through which he will divert the creek's water and work the bed of the stream.

Salt Lake *Tribune*: On Salmon river, on the Bohannan bar, near Salmon, eighty men are at work, with six streams running.

This has been an unusual season along the Salmon river, and but little fall of snow was had to insure a long running season.

Crismon brothers of Salt Lake have just put in a 10-stamp mill on their property on the divide of the mountains, forming the Idaho-Montana line.

The Blackbird, a copper and gold property near Leesburgh, which is bonded to Mr. Swift of Hailey, has large bodies of fine ore exposed.

A 20-stamp mill is going up on the Bonanza at Shoup.

MONTANA.

Inter-Mountain: Work will shortly be resumed at the properties of the Horr Coal and Coke Co., in Park county. The company owns 4000 acres of valuable ground and it is understood that soon the force will be increased one-third. This will mean the employment of about 500 men.

Much attention is being paid this year to the gold properties abandoned years ago because they were considered too low grade to work profitably. Butte people recently interested themselves in a group of gold claims near old Moose town, south of Butte, and it is understood a small mill will be erected this summer if the ore now being tested in Butte turns out as well as expected.

Sinking has been in progress for two months at the Pennsylvania shaft, one of the Boston and Montana properties, and the station at the eighth level is now being cut. This level is, however, 890 feet from the surface, the first station being cut at a depth of 190 feet.

About 150 men are employed in development work at the Butte and Boston properties.

The Anderson mine in the Ground Squirrel district has passed into the hands of the Boston and Montana Company under lease and bond, the latter being in the neighborhood of $75,000. There is said to be a good body of ore at the 200-level of the Anderson, and the company will begin there and at the same time develop the shaft from that level downward.

In the Red Bluff district S. A. Harsh, until recently superintendent of the Revenue, has taken hold of the Bradley, upon which there is a vein 30 feet in width. A test of the 30-ton lot is now being made at the Revenue.

Frank B. Turner of Butte, A. B. Smead of Missoula, and A. F. McDonald of Meadow creek, have purchased a half interest in a lease and bond on the Michigan lode for $5000, and will erect a cyanide mill to treat 100 tons of ore a day.

At Sheridan the Ruby Placer Mining Company, which constructed a big flume on Wisconsin creek two years ago to open up a rich stretch of placer ground, has struck bedrock, and will at once begin to wash out the ground.

Butte *Miner*: Ore is now being shipped from the Original mine. Workmen are now drifting on a good body of ore at the 900-level, while crosscutting is still being done at the 1000-level.

New ore has been encountered in the lower levels of the Clipper mine, near Pony. The mill at Pony is to be operated as soon as the road from the mine is in good shape.

Frank D. Smith of Butte has taken a bond and lease on the June Bug, in the Mayflower district, near Gaylord. The property is owned by the Invincible Gold Mining Company. It is developed by a 35-foot shaft. The bond runs for eighteen months from June 1st, and is for $50,000.

The Sweepstake, at the head of Rochester basin, is now being worked by Hodley, Steel, Stanchfield and Young, under a lease and bond. They have been sinking a shaft and are down about 80 feet.

Sinking on the Nippur claim is in progress at the 300-level and depth is gained at the rate of about 3 feet a day.

Preliminaries are under way looking to the early commencement of operations on the famous old Elgin mine, near the camp of Rochester in Madison county. It is the purpose to sink a double compartment shaft west of the apex of the vein.

The shaft work of unwatering the famous old Silver Bow, No. 2 mine, southeast of the Anaconda mine, having been practically accomplished, active repairing operations are under way.

COLORADO.

Republican: At Cripple Creek the output from the district during the month of May was within a few thousand of that of April. The mines have turned out a slightly increased tonnage of smelting ores, but the grade has been lowered because the managements have been sending to the smelters ores in the common class.

The Metallic Extraction plant at Florence handled 7200 tons of an average value of $25; the Colorado-Philadelphia at Colorado City put through 4450; the El Paso at Gillett, 1400; the Brodie at Mound City, 1776—all averaging $30 and giving 7627 tons at this figure. The stamp mills are estimated at 2000 tons of $12 average, and the railroads have hauled to the smelters 10,000 tons that would average at least $65. These figures make the total 26,576 tons, of a gross value of $1,082,780. There is little show for any immediate increase in these figures through the present month; neither is there for a decrease.

The Frank lease on the Modoc is producing steadily ore of a good grade in several levels from the surface to 400 feet depth, and sinking the shaft will be resumed within a few days.

The new plant on the Cranks is now in operation and the vertical shaft will be sunk from its present depth of 240 feet to 300 feet, at which point crosscuts will be run to both sides of the property.

The Moon-Anchor is turning out ore from the new south chute rapidly.

The Pharmacist will start its usual weekly shipment of about fifty tons.

The four miners who are working under lease the old Golden Fleece Company's shaft on the Colorado City are getting out ore from two of the levels and have pushed the 80-foot drift into a good body of ore.

A. G. White & Co., leasing the Hull City placer, shipped 300 tons of ore last month that averaged fully $30 a ton, and are doing almost as well at the present time.

Hoskins & Clark are getting on an average of five tons a day from their lease on the Mountain Monarch.

George Crawford has made arrangements by which the Little Annie and San Juan Consolidated mines at Summitville, Rio Grande county, are to be operated, after an idleness of more than twelve years.

Near Central City, in the Gilpin district, sinking is progressing on the Friend lode, which is one of the seven claims recently leased and bonded for $10,000 to an Eastern lady. The Friend vein is one of the largest in camp, and shows up well with present depth.

J. Hogan of Denver has taken a lease of the Mineral Point claim owned by J. Gilchrist and intends to start up work in a few days.

Work has been resumed on the Populist lode, which shows up as well as any claim in the district.

Sinking is being carried on in the None Such claim, and will be continued until a depth of 100 feet is reached.

The Poor Man property of Groceclose Bros. & Co. has been sold to New York parties for $10,000.

On the Chase tributers are stoping between the twenty-second and twenty-third levels, and a good grade of ore is being taken out. The milling ore taken out from the east and west 300 levels shows increased values of late.

At the Gettysburg mine on Bates hill, the sale of which was recently made to Wabash, Ind., parties, twenty men are employed and daily shipments amounting to thirty tons of ore are being made to mills.

At Georgetown the Dunderberg, owned by New York parties, has been and is producing large quantities of high-grade ore.

The Mendota is owned by Prof. R. O. Old of Georgetown and has been developed for more than twenty-five years. The property has yielded hundreds of thousands of dollars, and to-day it is keeping up its reputation as a producer.

The Diamond Tunnel Company of Baltimore, Md., which owns the Corry City and other mines, has been steadily prosecuting work on its properties for the past twenty-five years, with good results. To-day the property looks better than ever and regular shipments of ore continue to be made.

ARIZONA.

Republican: At Placerita Camp the Placerita mine is in operation again with about twenty men. A strike of ore running high was made in the Bonanza mine, which is now being operated by the Placerita Company.

Arnold Bros. have four claims with shafts on three claims at a depth of 100 feet.

From Congress is reported the bonding of the Tooker claims and Reese & Holden's Last Chance, together with the purchase of the Gibson ranch on Date creek for water rights and mill site. The purchasers are Rochester, N. Y., parties.

A bond has been given by W. Holmes on his mining property near Turquoise, in the Dragoon mountains, to Clark & Hoyt of Los Angeles.

At Yarnell the Devonshire has an incline shaft of 183 feet. There is 400 feet of development work. The ledge runs to a width of 18 inches and considerable free gold is found. The greater part is base, which is shipped to smelters.

The Yarnell mine will start up again soon. It is owned by the Big Four Gold Company of Baltimore. There is a 20-stamp mill, which is now running on custom ore.

Scientific Progress.

Are Rocks and Pebbles Organic?

To the Editor:—The following press dispatch seems to me worthy of comment:

Chicago.—Professor Edouard von Holst is carrying about with him the details of what he says will prove an astounding scientific revelation, one of the most far-reaching discoveries of modern times, and fit to rank with Darwin's great discovery of fifty years ago. It is no less a matter than the absolute demonstration that crystals, rocks, pebbles—anything which we have been used to consider as dead things—are in reality organic, that they contain life.

The discovery of the new scientific fact, which will vastly broaden not only science but philosophy, is that of Professor von Schroen, one of the faculty of Naples University, a Bavarian by birth, sixty years of age, and a man whose whole life has been devoted to science.

Professor Edouard von Holst seems just to have wakened up to this idea, while dozens of professors and philosophers have asserted the same in the past fifty years, as I here propose to show by quotations.

The German philosopher Loetze holds "that all atoms are conscious and of a spiritual nature." The consciousness of atoms extends to all material objects, *even to crystals.*

Professor T. Sterry Hunt says "crystals certainly live. When it is considered that these stone plants are affected by light, it can be realized that they are not so insensible as popularly supposed. The life of crystals is a different kind of life than that of plants, but, if I understand the term, they live in their own way quite as decidedly as do plants and animals."

Thomas A. Edison, in an interview with the *Republican*, says: "All matter lives and everything that lives possesses intelligence. A crystal is devoid of this principle, they say, and yet certain kinds of atoms invariably arrange themselves in a particular way to form a crystal. They did that in geological periods antedating the appearance of any forms of life, and have been doing it ever since in precisely the same way. Some crystals form in branches like a fern. Why is there not life in the growth of a crystal?"

Mrs. Anne Besant says: "The whole universe is a manifestation of central life, which is present in every atom of matter."

Professor Evan Hopkins, C. E., F. G. S., in his work published in 1851, entitled "Geology and Terrestrial Magnetism," says: "These crystals gradually grow until the aggregated calcareous mass form a systematic figure." Again: "It will, therefore, be evident that the mineral kingdom is like the vegetable, moist and in a constant state of activity, and, although this action is invisible to those who are confined on the surface, and so slow as not to be perceptible to the multitude, allowing them to build and live undisturbed. To conclude, we may briefly state that minerals grow out of rocks into all kinds of fractures."

Solomon J. Silberstein, in his recent work entitled "Disclosures of the Universal Mysteries," reaches still further on the same line of thought.

Almarin B. Paul.

San Francisco, May, '97.

Areas of Disease.

It is a common knowledge that diseases have, as a rule, their local habitations, says the London *Saturday Review.* Some, like tropical animals and plants, live only in the tropics; some, like consumption, are gradually spreading over the whole earth; others, like leprosy and small-pox, are gradually becoming limited in their distribution, and may actually be tending toward extinction. Again, there are regions to which diseases have never reached. On the summits of high mountain ranges and in the circumpolar snowfields the earth and air and water are as barren of the microbes of disease as they are of animal life. Without question, if Nansen and his companion had been exposed to the same hardships and the same unsanitary conditions in these islands, the lowered vitality of their bodies certainly would have been unable to resist the continual bombardment of germs to which we are all subjected. In a country like Britain, thickly populated for many centuries, and with the freest circulation of population, it cannot be doubted that every yard of surface contains the germs of the more common diseases, and the native of some newer land, brought over here, falls a victim to our plague-stricken soil. By generations of a destructive elimination we have become highly resistant to our native diseases, just as the Gold Coast natives are less susceptible than we are to their own local diseases. But we are not fully protected, and cancer and consumption—two of our common scourges—still take a large annual toll. It may be assumed that both are due to micro-organisms, the microbe of consumption being well known, that of cancer being as yet only suspected. Probably no inhabitant of Britain escapes infection by the cancer organism; certainly none escape infection by the microbe of tubercle. Most of us, fortunately, resist the intruders and are unaffected by the disease.

Alcohol Effect on Animal Life.

Professor C. F. Hodge, who has been conducting experiments on the influence of alcohol on the processes of life, in an article in *Popular Science Monthly* describes the effect upon a number of dogs which had been subjected to its influence.

One marked and striking effect of the alcohol—evidently the effect of that—was to make the two of the dogs that had been chiefly subjected to the test, full of groundless fear. Though treated with the utmost and unvarying kindness, they approached a kindly call, or extended hand, "with cringing and trembling, like a Chinese culprit before his executioner." Professor Hodge cannot avoid calling attention to the fact already well established, that in the human being alcohol, persistently drank, produces fear. The worst of all forms of dread is manifested in the horrible alarms of the victims of delirium tremens. The experiments are to be continued for at least one more year—if not, as Professor Hodge hopes, through the complete life story of these dogs. No doubt the effects of alcohol on beasts do not in all ways correspond to those produced in man; but the essential effects, or some of them, are at least very similar—and Professor Hodge's experiments seem to be of great value and importance. They tend to confirm scientifically facts which have been the subject of common observation in the habitual whisky drinker.

The committee of the seventh International Geological Congress has issued a circular specifying the order of business for the meetings in St. Petersburg on August 29 to September 4. The subjects to be considered by the congress are general principles of international importance. First, the congress is asked to decide whether geology shall adopt the artificial classification, based solely on historical data, or the natural classification, based on the changes of physical geography or fauna, and not on the accidental limits of various divisions called after the name of the country where they have first been determined. Secondly, rules will be drawn up to be followed in the introduction of new terms in stratigraphical nomenclature. Lastly, another question of equal importance is that of petrographical nomenclature. Some agreement as to its principles is urgently required. The flood of new terms has attained such dimensions that soon no human memory will be able to retain the mass of new words, and the reading of each paper will necessitate the use of a special dictionary.

A curious instance of the ignition of coal dust by the sun's rays is recorded in *Glueckauf.* At the Maybach colliery, in the Star district, the surface works are chiefly of iron, and the floating dust in the course of time formed a deposit more than an inch thick on some girders. It was found that the layers of coal had extended along the whole length of the south wall, and, heated by the sun, the metal plates ignited it. This affords a possible explanation of fires at similar surface works.

H. Moissan has presented to the French Academy of Sciences the results of his recent researches on the direct union of carbon and iron at a high temperature. When pure iron and carbon are melted together in the electric furnace and allowed to cool slowly, the metal is found to contain only a very small quantity of combined carbon, a grey pig iron being obtained that solidifies at 1150° C. By suddenly cooling in water iron saturated with carbon at 3000°, the metal became crystalline in structure, and from it was separated brilliant crystals of the carbide of iron Fe_2C, identical with that occurring in steel. Curiously enough, although this was one of the first metallic carbides known, it has proved to be the last to be prepared in quantity by direct synthesis.

Extraordinary power is claimed for the new signaling light of Col. Milklashevski, of the Russian engineers. Its signals have been read at a distance of thirty-four miles, and it is hoped the distance may be increased to nearly sixty miles by the use of reflecting mirrors. The light is produced by spirit, which is colored by a red and a green powder of secret composition. The lantern embraces two tubes, ending with pear-shaped balls, which, on being pressed, emit respectively brilliant red and green flashes, by which the signals are transmitted. The apparatus weighs only seven pounds.

The *Comptes Rendus* of the French Academy of Science announces that the black coating produced on diamonds exposed to cathode rays is a very stable form of graphite. The transformation of the diamond into graphite requires a temperature of at least 2000° C.

Electrical Progress.

Alternating Current Dynamos in Parallel.

The disadvantages of the prevailing system of running each machine on a separate circuit are set forth in a paper by J. E. Woodbridge in the *Electrical Engineer:* "The number of circuits increases necessarily with the number of machines, and the problem of properly distributing the loads on those circuits, so that in the evening each generator shall do its full share of the work, and yet not be overloaded by some unanticipated addition, is a serious one. A compromise which results in poor economy always has to be made with loads which are subject to sudden changes that cannot be foreseen in the central station, such as the theater and church loads, etc. Then constant attendance is necessary, as the load rises and falls through its daily range, to start up the fresh dynamos as they are needed, and switch on to them the different lines; and again, when the load falls off, to properly branch the lines on certain dynamos, so as to keep the machines which are running always as near to their most efficient loads as possible. No little ingenuity is needed when the dynamos in the house are of various sizes and capacities. When the conditions are further complicated by the necessity of giving the longer feeders a higher voltage than the shorter ones, the increase in that voltage being proportioned roughly to the load, the switch-board man has no easy job. Added to that, is the necessity of carrying over his circuits as nearly instantaneously as possible to prevent too long 'wink' in the lights; and the risk of accidentally throwing two machines in multiple by a mistake in the manipulation of his switches."

Mr. Woodbridge goes on to show that all the disadvantages which he has comprehensively enumerated are completely removed by "running all the alternators in a station in multiple on one set of bus-bars, from which all the feeders are tapped off, either direct or, in the case of long feeders, through adjustable boosting converters." He proceeds to show how the number of feeders can be thus much reduced and economy increased.

A Novel Engineering Work.

A novel engineering work has just been commenced at Rouen, France. It is called a "pont transbordeur," and serves all the purposes of a bridge while not interfering with the free passage of ships, even of those with masts 150 feet high. Two diminutive Eiffel towers are to be erected—one on each bank of the Seine, three-quarters of a mile below the lowest existing bridge at Rouen—and a narrow iron bridge will be suspended by chain cables between their heads. It is to be not less than 160 feet from the level of the quays, but it is not intended either for carriages or for foot passengers. Several lines of rail are to be carried along it, and on these a skeleton carriage or platform on wheels will run. This will be dragged from side to side of the river by steel ropes passing over a driving wheel, to be worked by steam or electricity from one of the banks. To the skeleton platform will be hung, by steel hawsers, at the level of the quays, or 160 feet below the bridge, the transbordeur—a slung carriage—within which passengers and vehicles will be transported from one bank to the other. This carriage is to be 40 feet in width by 33 feet in length. The electric tramways running on the quays on both sides of the river are to make a connection at this point, and the transbordeur will be fitted to carry the tram cars so that passengers by them will cross the river without changing their seats.

Electricity in Machine Shops.

Overlooking the whole field, the application of electricity to mechanical processes seems to divide into three parts. First, in point of time and aggregate commercial importance, stands the introduction of electric motive power into machine-operating establishments.

The inducement to this step is simply the lessened cost of power that comes from a method of distribution the most efficient yet devised, with the added advantage that comes from generating power in large units, rather than small ones.

Second in order of present importance come electric labor-saving devices—those applications of electric power which are primarily directed, not so much toward the cheapening of the power used, as toward its employment in the most direct way and with the minimum amount of labor. There are many operations in which the change from crude to refined motive power means an enormous reduction in the use of the human machine, and such change is in this country of particular economic importance.

Finally, we must consider the profoundly interesting class of cases in which the employment of electrical energy has not merely cheapened and facilitated some mechanical operation, but has radically changed the process itself, giving us not only new conveniences, but new methods. Here electricity comes to the rescue by revising or replacing old ways of doing things, and thus saving power, or labor, or both.—Louis Bell in Engineering Magazine.

The Copper Supply.

Electricity without copper would be somewhat like astronomy without telescopes, but whilst everyone reads with avidity news of gold discoveries, who troubles about copper? At the moment the copper miners of the world are working their hardest to keep pace with the enormous demand for electrical purposes, and the available stock of metal is lower than it has been for very many years. It is possible that in a few years' time the earth will be searched

as diligently for copper as it is for gold, as the demand goes on increasing, and must continue to do so with electricity still in its infancy. With demands increasing and stocks decreasing, the natural conclusion of the business man would be that we should see a rise in the value of the metal, but the obliging bears have been good enough to depress prices for reasons of their own, and consumers are thankful. Less than two years ago there were 40,472 tons, whereas, by the latest returns, the available stock is only 18,595 tons, whilst the price has recently fallen about £5 a ton. Whether we may expect a copper famine or whether the operators, notwithstanding the lowness of the stocks, are keeping down the price with the view to a big "corner" later on, we cannot say, but it would be well for consumers not to run short of supplies.—Machinery.

THE supplying of electric power to working people in their houses is making considerable progress in France. A British consul writes that whilst in Lyons there are several companies with large capital engaged in the experiment, still they are not sufficiently advanced to indicate their chances of success, but in St. Etienne the problem appears to be already solved. At the present moment 1200 looms, of which about two-thirds are situated in the town, and remainder in the surrounding districts, even as far as thirty miles away, are driven by power distributed by the company of St. Victor-sur-Loire. This company, founded in in 1893, with 1000 H. P., has since that date added 400 H. P., now working, 1200 H. P. on the point of being used, and now propose to add another 3000. The electrical energy is furnished at the price per loom of 8s per month, and the time when the loom is not working is allowed for at the rate of 4d per diem.

Mechanical Progress.

The Largest Compressor Engine in Canada.

The compressor engine shown in engraving is the largest ever put in operation in Canada, and was recently installed at the famous LeRoi mine, Rossland, B. C.

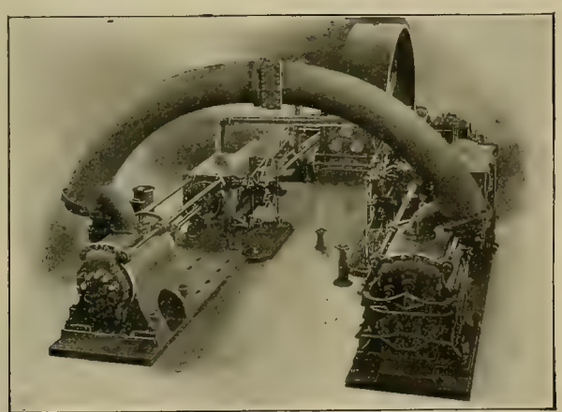
It was built by the Rand Drill Company, of 100 Broadway, New York city, in their Canadian shop at Sherbrooke, P. Q., and is described as a beautiful piece of mechanism as it was shown standing on the shop floor at time of inspection.

On the steam end the engine is of the Corliss type, made in the form of a cross-compound condensing machine. The high pressure cylinder is 22 inches in diameter by 48-inch stroke, taking steam through a pipe 6 inches in diameter. The low pressure cylinder on the opposite side of the machine is 40 inches in diameter by 48-inch stroke. Both cylinders are fitted with the Corliss liberating type valve, with vacuum dash pot, and with a sensitive governor operating on the release gear, to be operated automatically from six or eight revolutions to the maximum number of revolutions per minute. The main shaft is 14 inches in diameter by 13 feet long, weighing about 5500 pounds. The shaft is fitted with cranks pressed on under immense pressure. The connecting rod forgings and piston rod forgings are well and carefully finished.

The air end of the machine is fitted tandem with the steam cylinders, and is also compound, the high pressure air cylinder being 22 inches in diameter by 48-inch stroke. The valve motion supplying these cylinders is Rand's most economical type, being in the form of mechanical valves. By this means the low pressure cylinder is insured being filled with air at atmospheric pressure, which fact largely affects the efficiency of the machine, for were the cylinders either not completely filled, or were the air hot and expanded, in just such a ratio would the efficiency be decreased.

The inlet valves of the low pressure or intake cylinder are surrounded by a hood, which is connected to a flue for the introduction of cold air from out of doors.

Between the high and low pressure cylinders is an intercooler of the latest type. Through this intercooler the air passes over a system of water-circulating pipes and is cooled in the process. This giant compressor engine will be used for running all the pumps and hoists at the mine, in addition to operating forty drills.



THE LARGEST COMPRESSOR ENGINE IN CANADA.

The Use of Compressed Air for Mining Purposes.

NUMBER V.

A lecture delivered to the Engineering Students of the Leland Stanford Jr. University, May 3, 1897, by EDWARD A. RIX, M. Am. Soc. M. E.

A hoist of the character referred to will be found much easier to care for than one operated by steam, for there will be no condensed water to be carried off, and the machine is ready to start in instant operation at a second's notice. There is no other manipulation, as far as the motive power is concerned, except the opening of the throttle valve.

In the operation of a hoist of this character the service of storage reservoirs in conjunction with compressed air service becomes very apparent, and, as stated before, a hoist which required from 80 to 100 H. P. to operate while it is in service would in the average mine require but 25 to 30 H. P. at constant work delivered by the compressor. The advantage of this is apparent, and while it is approached by steam power, cannot be matched by any other service excepting by a water wheel plant having large reservoir capacity.

And for the reasons which I have heretofore stated, it is evidently the very worst proposition for the economical use of electricity, and the greater the proportion of the entire power used by the mine, that is devoted to an electric hoist, the poorer will be the efficiency of the whole system, for the maximum amount of power required by the hoist must be purchased and brought to the hoist motor ready for consumption at any time. Of course this loss will be obviated whenever storage batteries become possible for every day use.

The next surface motor of importance around a mine will be the mill engine, which as a general rule has a constant load. It is only in the smaller mills that the power required for the rock breaker is intermittent, but in such a plant as we have been considering the rock breakers will probably be of such a size that they can run continuously from the ore bins, which will render the total power required from the mill engine a constant.

In this case, for compressed air the engine will probably be, for ordinary purposes, a straight running simple Corliss engine using reheated air. If the mill requires a considerable power, it would be advisable to install a tandem compound Corliss engine, where the air will be reheated twice, as in the case of the hoisting engine.

Compressed air can claim no particular advantage over electricity in its economy for driving this constant load, nor for that matter, over a high efficiency water wheel or a compound condensing steam engine. The honors are practically easy all along the line.

Our general system being compressed air, therefore, there is no loss or disadvantage in using it for the constant load. The same course of reasoning will apply to engines which may be used for driving Cornish pumps from the surface, or any other constant load requirement, such as driving fans or tramways. For intermittent work, such as a saw mill, in connection with a mine, compressed air would have the same economy with a properly designed motor, as for the hoist.

Outside of the requirements heretofore mentioned, the only other required service would be for furnishing lights. For an ordinary mine 10 or 15 H. P. would readily supply this. Compressed air of course will have to be transformed, through an air motor and dynamo, into electricity, for furnishing lights, and this naturally must be at considerable loss, and of course in this instance furnishing the electric current direct would be very much more economical, but the amount of power required for this service is so insignificant in reference to the balance required by the mine that it need not be seriously considered.

For underground work there are practically but three kinds of work required—hoisting from winzes, running of rock drills and pumping.

Owing to the fact that as a general rule it is not desirable to place large or expensive hoisting plants under ground, the character of the engines used is not very economical, but the work is so intermittent in its character—much more so as a general rule than the hoist on the surface—that even these uneconomical engines can be operated with compressed air much less than by electricity. In many cases it is desirable to reheat this air, which can be done with perfect ease, either by means of an externally fired furnace using either wood or coal where an old shaft or a proper system of ventilation will take the gases of combustion, or the air may be heated by an internally fired furnace in which coke is placed at proper intervals of time in sealed chambers made to withstand the air pressure, and through which the compressed air passes, furnishing oxygen for the combustion.

It is always well in installing underground hoists of all kinds to place in close proximity as large reservoir capacity as possible.

For underground pumping, ordinary direct acting steam pumps, using air for actuating them, are the most uneconomical machines that can possibly be employed in the use of any power and should never be used unless their utility more than counterbalances their waterfulness of power.

In sinking pumps, especially in confined spaces, there is scarcely any other form of pump that can be used with any degree of satisfaction, and utility is the only thing to be considered. A power driven pump would be undesirable under such circumstances. For large spaces, compound direct acting pumps, for sinking pumps and even station pumps, have a reasonable degree of economy but would at the same time require an element of utility to be considered in order to counterbalance the economy of an electrically driven station pump. The latter, however, possesses so many disadvantages in the fact that gears are nearly always introduced for the reduction of speed and are subjected to tremendous wear, that their use is limited.

(To be Continued.)

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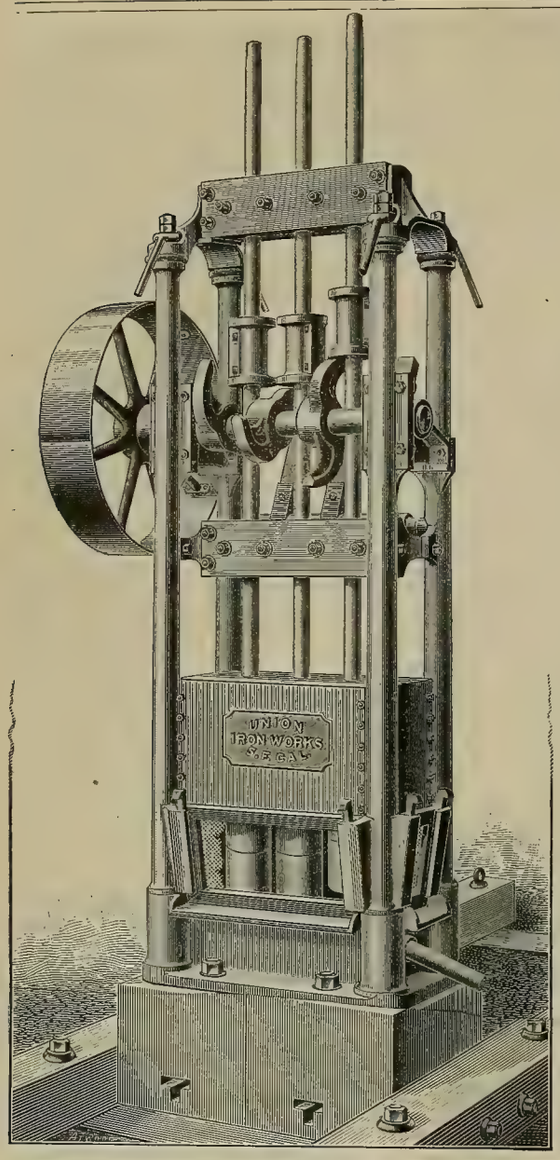
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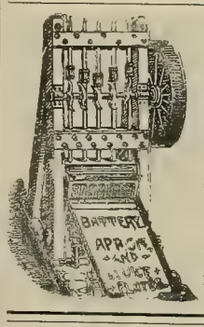
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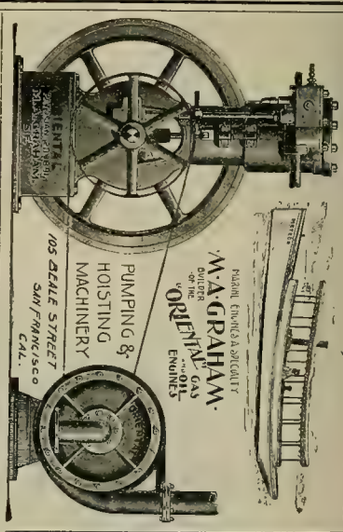
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Coast Industrial Notes.

—A branch road will be built next fall to Globe City, Arizona.

—San Diego, Cal., exported fifty tons of honey last year.

—The San Joaquin Valley road is now in operation to Hanford, Cal., and tracklaying continues south.

—The S. F. Board of Supervisors have petitioned Congress not to abrogate the Hawaiian reciprocity treaty.

—Preliminary surveys are being made by C. Harlow for a railroad from San Diego, Cal., to Ramona via Lakeside and Santa Maria, forty miles.

—A company has been incorporated in San Bernardino to erect a cannery there to pack and can deciduous fruits annually raised in that neighborhood.

—A syndicate of Chicago and Milwaukee capitalists has just bought 3,000,000 acres of coffee land in the Territory of Tepic, Mexico, for $900,000 in Mexican silver.

—The Union Iron Works have made the Government an offer to provide diagonal armor plate for the battleship Wisconsin, now building at their works in this city.

—In '90 the assessed value of the counties comprising southern California aggregated $109,000,000; in '96 it was $136,000,000. In '90 the population of that area was 201,352; in '96, 309,000.

—A contract has been let by the Treasury Department at Washington for the purchase and removal of buildings now on Seventh and Mission streets, San Francisco, the site for the new postoffice.

—At Port Angeles, Wash., last Tuesday, the sawmill which was built by the Puget Sound co-operative colony in 1887 was totally destroyed by fire, together with the wharf. The loss is about $20,000.

—Field & Marshall are starting a factory at North Ontario, Cal., in which to manufacture citric acid from lemon culls. Most of this article is now made in Italy. There is a duty on it of five cents per pound.

—A big irrigation scheme is under way in Whitman county, Wash. The Palouse Irrigation Company has been organized and will build sixteen miles of ditch this summer. It is planned to supply 200,000 acres with water.

—Santa Fe road surveyors are at work on a route through from Deming to Globe. The proposed route will come in as direct a line as possible to Duncan and from there almost direct to Solomonville and then on through the valley to Globe.

—It is reported at Hermosillo, Mexico, that concessions have been granted to the people representing the Southern Pacific and the Banam Steamship Company to build a line across the republic from the Gulf of Mexico to the Pacific coast.

—There was filed last Thursday at Albany, N. Y., a certificate of incorporation of the Rio Grande, Sierra Madre & Pacific Railroad of Mexico; capital stock, $3,120,000. The company purposes to construct a road from Ciudad Juarez, Chihuahua, to Corralitos, 56 miles.

—The Sierra Railway Company's road now extends from Oakdale to Cooperstown, nineteen miles, and is doing business between those points. The rates are on ore and concentrates, value not to exceed $300 a ton, $2.65; lead, value not to exceed $100 a ton, $2.20; and base metal, copper matte, bar and block copper, value not to exceed $300 a ton, $2.65.

—The report of the San Francisco Produce Exchange for the month of May last shows the flour and grain remaining in the State of California on June 1st: Flour, barrels, 94,960; wheat, centals, 1,733,880; barley, centals, 758,600; oats, centals, 81,980; beans, sacks, 505,730; corn, centals, 61,280; rye, centals, 21,360.

—The Stanislaus county, Cal., Supervisors propose building a wagon road across the mountains between the Santa Clara and San Joaquin valleys. The State Highway Commissioners report that twenty-two miles of road between the Mount Hamilton Observatory and Newman, in the San Joaquin valley, would unite the two valleys.

—The report of the secretary of the Redlands Orange Growers' Association for the season shows that the association sold 3,009,310 pounds of Navel oranges, of which amount only 426,533 pounds were packed as seconds. The net average price of the first quality was 2.64 cents a pound. The amount realized from Navels was nearly $90,000 f. o. b. The total amount received of all kinds was 5,034,010 pounds, which made up 197 cars. The gross amount realized was $119,600.53. The net amount paid the growers was $92,815.11.

—The Southern California Power Company will put in an electric transmission plant to carry power eighty miles — more than twice as far as any other plant in existence, the next longest being thirty-five miles. The power station will be in Santa Ana canyon, twelve miles from Redlands and eighty miles from the point of development at Los Angeles. The current will be generated at 1000 volts and transformed into 33,000. The highest voltage that has ever been attempted ere this is 15,000. This pressure of 10,000 volts is now used by the Central California Electric Company in transmitting power from Newcastle to Sacramento, a distance of thirty-five miles. The power is derived from the waters of the Santa Ana river, which is to be directed from the stream by a canal, flume and tunnel work along the side of the canyon to a point where it drops through 2200 feet of pipe a distance of 750 feet to the water wheels. The power generated will be sold to companies in Los Angeles and Pasadena and used for street railway and lighting purposes. The company has closed contracts for equipment. The contract for the machinery for the generating station in Santa Ana canyon was given to the General Electric Company of New York. The Westinghouse Company of Pittsburg was given the contract for supplying the machinery for the distributing stations at Los Angeles and Pasadena. The two contracts amount to $140,000.

Personal.

JAMES CRONAN, formerly superintendent of the Hale & Norcross mine on the Comstock, is about to go to Rossland, B. C.

W. W. MONTAGUE, treasurer of the California State Miners' Association, has been designated Postmaster of San Francisco.

FRED G. RANSOME of the Department of Geology in the University of California has been appointed an assistant in the U. S. Geological Survey.

SAM GILSON, after whom the asphalt of the Uncompahgre reservation in Utah was called gilsonite, has taken a lease and bond on the Cherokee mine in Cherokee county, Georgia.

MARSDEN MANSON, president Department State Highways, will shortly leave San Francisco to attend the International Geologic Congress at St. Petersburg, Russia.

J. A. YEATMAN, late in the employ of the E. P. Allis Co., has been engaged by the Parke & Lacy Co. as consulting engineer and traveling salesman, with headquarters in this city.

FRANK A. LEACH of Oakland, editor of the *Enquirer*, has been appointed Superintendent of the branch United States Mint at San Francisco to succeed John Daggett, whose term will expire about July 1st.

Recent California Mining Incorporations.

Prince William Sound M. and T. Company, San Francisco; W. T. Farrar, W. W. Deamer, L. M. Hoefler, F. J. Burke, J. H. Jennings; capital stock, $1,000,000; subscribed, $250.

Kelso Creek Mining and Development Co., Los Angeles; J. H. Williams, B. F. Vruland, W. H. Davis, E. M. Hanna, E. S. Tomblin; capital stock, $300,000—$5020 subscribed.

Imperial G. M. Co., Stockton, Cal.; D. A. Vaughn, T. N. Moore, W. H. Chestnutwood, C. Moring; capital stock, $200,000; subscribed, $100,000.

German M. & M. Co., S. F.; C. O. Richards, R. J. A. Weir, L. A. Gibbons, M. E. DuBois, F. R. Deering; capital stock, $1,000,000; subscribed, $250.

Commercial Paragraphs.

C. H. EVANS & Co., formerly 110 Beale St., have removed their machine works to their large new brick building, 183-185-187 Fremont St., San Francisco.

THE Pacific Mining Machinery Co. of San Francisco has shipped a No. 3 Pacific amalgamator to be placed in the quartz mill of the Golden Grape Mining Co. near Acton, Cal.

THE Fulton Engineering and Shipbuilding Works, 213 First St., San Francisco, are building a pyritic desulphurizing furnace for the Mountain Copper Co., Keswick, Cal. They are also building a Falding pyritic furnace for a local manufacturer of sulphuric acid.

THE United Globe Mines Company of Globe, Arizona, have installed a new quadruple friction hoist, of the Hendrie & Boithoff make, at their mines at Globe. The Trade Dollar Mining and Milling Company of Silver City, Idaho, have also put in position a Bolthoff combined gear and friction hoist at their mine at Silver City.

THE Colorado Iron Works are putting in a plant of sampling machinery for the Kilton Ore Sampling Company of Breckinridge, Colo. The company recently sold an 8400-foot Finlayson wire-rope tramway for the Sunnyside mine at Silverton, Colo. One of these tramways is operating at Sanden, B. C., on the Noble Five mine.

THE Risdon Iron Works, Beale and Howard Sts., San Francisco, have supplied machinery for two river dredgers, now building at Marysville, for operations on the Yuba. In some respects the method is a novel one. The boats are each 90 feet long, 9 feet beam, drawing 26 inches, built together at bow and stern, the dredge buckets operating through a well hole between on an endless chain, to the end of a chute and back to the stern, where their contents are emptied into a perforated revolving cylinder, whence the finer material is dropped on an inclined apron of cocoa matting, the coarse gravel, etc., going overboard, the gold-bearing sand passing through a sluice box. Eighty tons per hour is the stated capacity. The work is in charge of W. H. Telford of the Archimedes Mining Company.

Recently Declared Mining Dividends.

Swansea Mining Company, Utah, of 5 cents per share, $5000; payable June 10th.

Champion Mining Co., Nevada City, Cal., 25 cents per share; payable June 15.

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR WEEK ENDING JUNE 1, 1897.

583,565.—DENTAL BRIDGEWORK—C. M. Carr, Los Angeles, Cal.
583,787.—INSULATOR—W. Christie, S. F.
583,845.—SASH FASTENER—D. A. Crichton, Los Angeles, Cal.
583,458.—FAUCET—W. Curlett, S. F.
583,794.—REFRIGERATOR CAR—E. T. Earl, Los Angeles, Cal.
583,705.—PUMP—R. W. Elliott, Brentwood, Cal.
583,528.—RUBBER SHOE—F. Ephraim, S. F.
583,572.—CHURN—Gordon & Cox, Linden, Cal.
583,685.—FLOOR, ETC., CONSTRUCTION—P. H. Jackson, S. F.
583,808.—TROLLEY FINDER—G. E. Johnson, Los Angeles, Cal.
583,687.—HINGE—Lash & Street, Sacramento, Cal.
583,536.—SPRING HINGE—E. E. Masters, Sacramento, Cal.
583,689.—WAVE MOTOR—W. McDonald, Chicago Park, Cal.
583,601.—DESK—J. F. Meissner, S. F.
583,580.—FARE REGISTER—Murray, Magee & Wagniere, Los Angeles, Cal.
583,818.—CARBURETOR—F. A. Redmon, S. F.
583,693.—BULLET HOLDER, ETC.—H. Rogers, Salinas, Cal.
583,820.—FUSIBLE SOCKET—S. H. Russell, Watsonville, Cal.
583,605.—BEAN PLANTER—W. S. Saviers, Hueneme, Cal.
583,519.—CONCENTRATOR—L. R. Tulloch, Angels, Cal.

NOTE.—Plain and Certified Copies of U. S. and Foreign patents obtained by Dewey & Co., by mail or telegraphic order. American and Foreign patents secured, and general patent business transacted with perfect security, at reasonable rates, and in the shortest possible time

Notices of Recent Patents.

Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

WAVE MOTOR. — W. McDonald, Chicago Park, Cal. No. 583,689. Dated June 1, 1897.

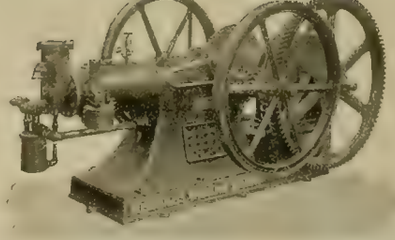
This invention relates to an apparatus for applying the power produced by the movements of waves or ocean swell. It consists of a rising and falling float, with suitable guiding poles or posts to keep it in place, a mechanism by which the rise and fall is transmitted to produce a continuous rotary motion. This mechanism consists of shafts journaled upon guide posts above the opposite ends of the float, with sprocket wheels connected by a chain having oppositely disposed clutch mechanisms, and pawls, gear-wheels, rack bars yieldingly connected with the float and yokes by which the bars are retained in contact with the gear wheels, so that the rise of the float acts through a gear to rotate the shaft in one direction, and the fall of the floats acts to rotate it again in the same direction. By this construction the constant rise and fall of the waves or a swell in any exposed locality where the apparatus may be placed, will cause a corresponding rise and fall of the float, and the action through the connected mechanism serves to produce a continuous rotary motion, which will transmit the power of the waves so that it can be used in any suitable or desired manner.

HINGE. — T. M. Lash and S. A. Street, Sacramento, Cal. No. 582,687. Dated June 1, 1897. This invention relates to a hinge which is especially adapted for use upon hinge sashes, the parts of the hinge being attached to the casing and the sash and normally disengaged, so that the sash may be raised and lowered or thrown into engagement to complete the hinge and enable the sash to be turned about, so that the outside of the glass can be readily reached. The hinge consists of casings let into the window frame and the stile of the sash. A bar is pivoted in one of the casings adapted to be turned vertically, lie flush with the face thereof or turned into a horizontal position, and the bar in the other casing may also be turned from a vertical to a horizontal position, the two being pivoted or united to form a hinge when in use, and when not in use they are closed up within the respective parts of the window to leave a smooth surface.

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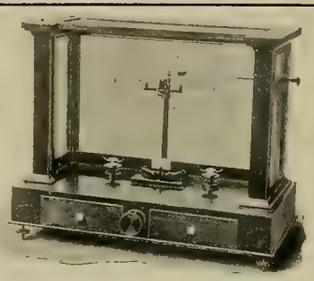
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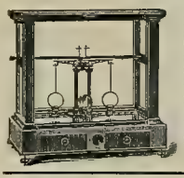
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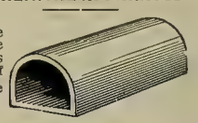


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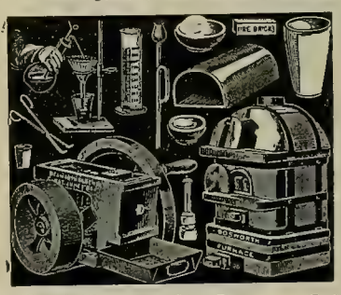


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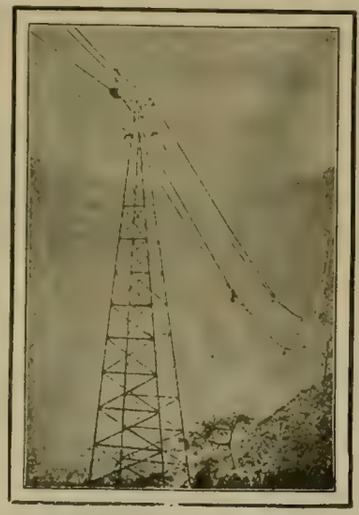
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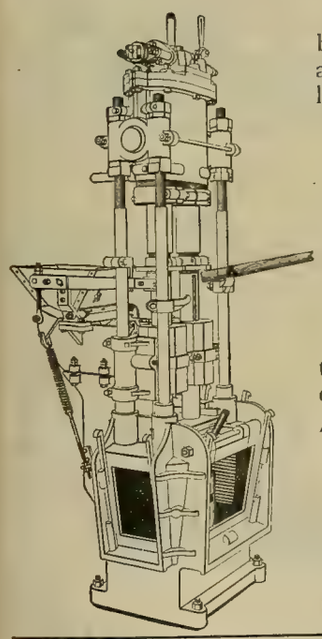
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We use one cord of pine wood in 24 hours, and run the mill with 70 to 80 lbs. of steam.

I have followed mining in connection with milling for thirty years and have never seen its equal for convenience, durability and cheapness. To parties wishing to purchase a quartz mill I cheerfully recommend the Tremain Steam Stamp Mill for its small cost, economy in operation and complete results of working. Very truly yours, [SIGNED] JAMES C McDONALD,
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This Mill has the capacity of a 5-stamp gravity mill and costs less than half to install. Automatic feeder of approved design. Weight of entire Mill 3300 lbs. Made sectional for mule-back transportation.

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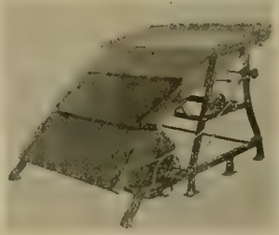
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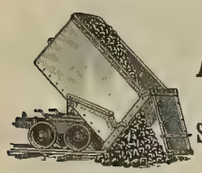
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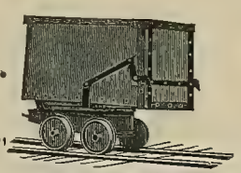


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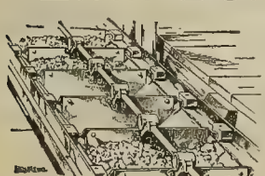
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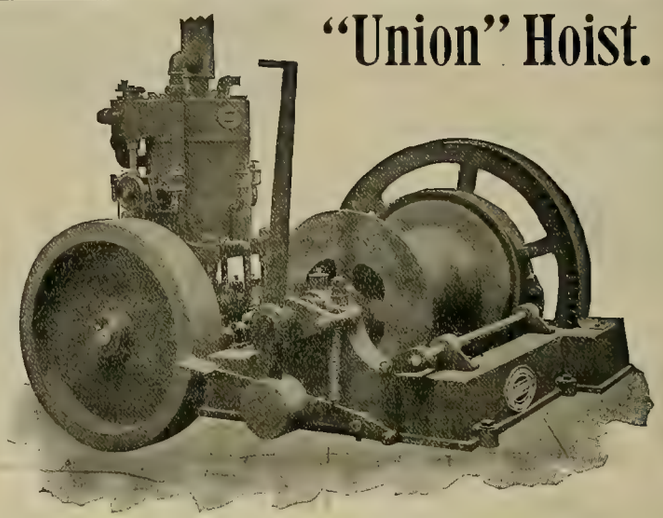
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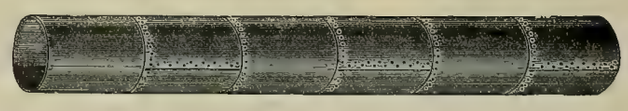
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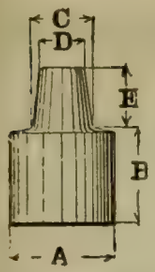
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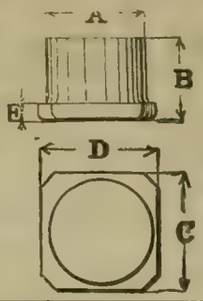
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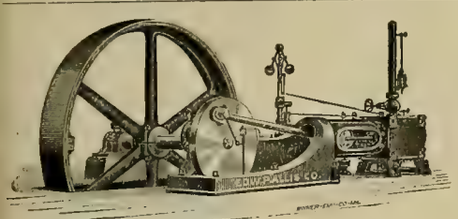
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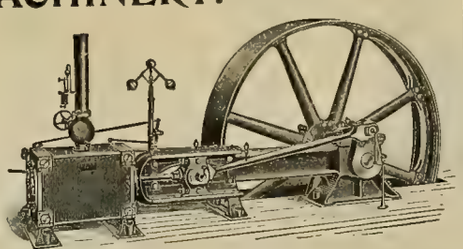
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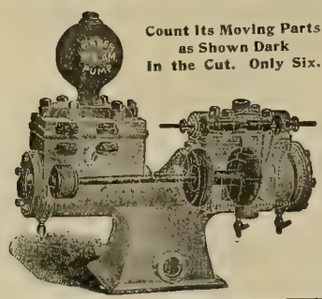
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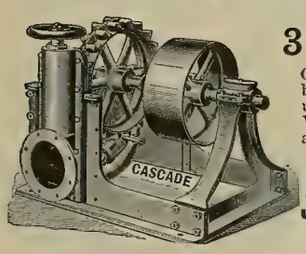
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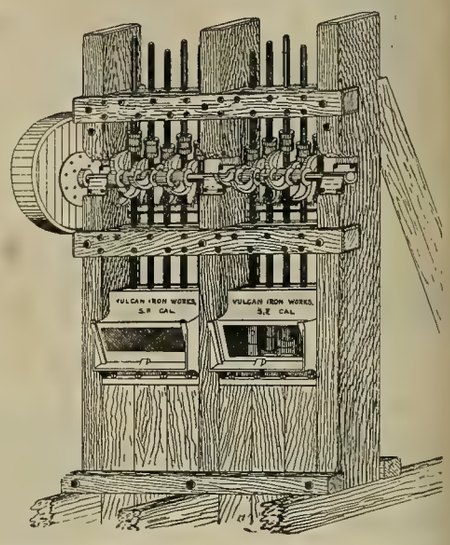
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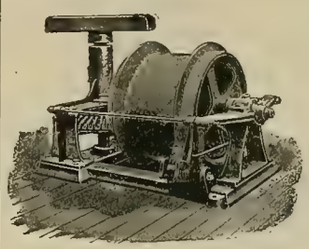
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LIGHT STEEL RAIL.

The Mine and Smelter Supply Co., Denver, Colo.

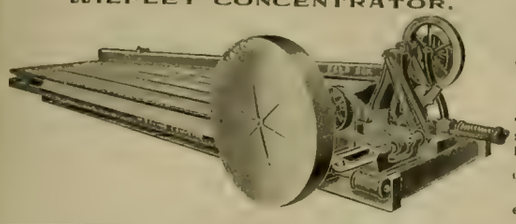
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And claim for it BETTER work than any Concentrator made, with a capacity of from 15 to 25 tons per day of 24 hours. It is simplicity itself. No moving belts or intricate parts. Any one can learn to operate in an hour.

WILFLEY CONCENTRATOR.



For confirmation of all of the above we refer to Henry Lowe, Puzzle Mine, Breckenridge, Colo.; Mary Murphy Mine, St. Elmo, Colo. W. E. Renshaw, Mayflower Mill, Idaho Springs, Colo.; H. E. Woods, Denver, Colo.

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ASPEN, COLORADO, April 8, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Your favor of the 5th inst. at hand and noted. In regard to the Wilfley Table I wish to say that I consider it to be the best device in use to-day for concentrating fine ores; that it will save everything that a gold pan will; that it combines the clean saving of a Rittinger with the capacity of a buddle. I think that without question it will supplant in time all other devices for handling fine and slimy ores. This includes all the vanning machines and buddles. This is higher praise than I am in the habit of giving, but I feel sure that it is deserved, and you may make any use of this that you desire. Yours very truly,

[SIGNED] S. I. HALLETT.

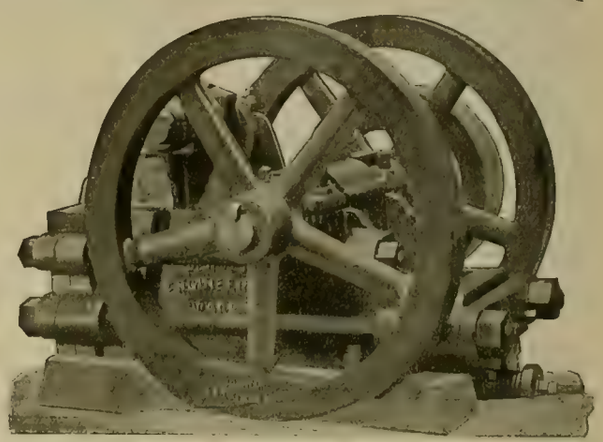
These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

PRICE, $450.00.

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Wrought Iron Tension Bars, Safety Toggle Plates,

Increased Strength, Saving in Freight, Less Weight, Easily Transported.



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Denver Engineering Works Company,

DENVER, COLORADO, U. S. A.

THE FINLAYSON PATENT WIRE ROPE TRAMWAY.

THIS TRAMWAY IS THE BEST THAT HAS EVER BEEN PLACED ON THE MARKET. IT HAS NO RIVAL. IT IS STRICTLY AUTOMATIC AND ITS CAPACITY RUNS UP TO 1000 LBS. PER BUCKET. ANY ONE CONTEMPLATING THE ERECTION OF A TRAMWAY SHOULD INVESTIGATE ITS MERITS BEFORE PURCHASING ELSEWHERE. . . . . .

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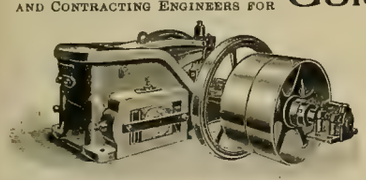
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WE ARE MANUFACTURERS OF AND CONTRACTING ENGINEERS FOR **Gold, Silver, Lead, Copper and Pyritic SMELTING FURNACES.**

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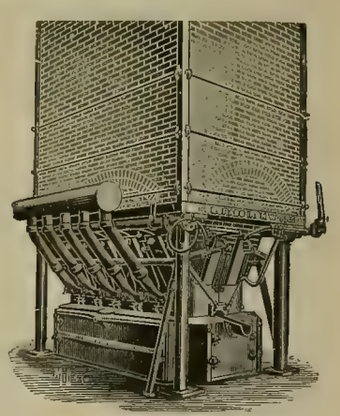
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We Guarantee Capacity Per Day to Any Degree of Fineness.



Improved Black Hawk Ore Breaker.

OUR PATENT HOT BLAST APPARATUS for all Smelting Furnaces is a Success. A great economizer of fuel, and enlarges capacity of furnace.



Standard Silver-Lead Water Jacket Smelting Furnace.

Equipped with Arch-Bar System of Mantles, insuring rigid and strong walls. No Cracks.

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We are the one great "Pebble on the beach."

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When in the market for machinery or supplies send specifications to us for our prices. Our stock is the largest and most select carried in any mining district in the United States.
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Market Reports.

The Markets.

SAN FRANCISCO, June 10, 1897.

The slow progress made in the Senate on tariff legislation, combined with the change of front on several important items, is doing no little in restricting trade from first hands by causing jobbers to keep stocks in many lines to as low a point as it is consistent with their trade. From every jobber and importer spoken to there is but one response, viz., no pressing for business or stocking up on goods until a clearer insight is obtainable into what Congress will do on the tariff bill now in the Senate. Manufacturers in about every branch are in the same position. They hardly know how to figure on large contracts owing to their not knowing what the tariff on the raw product will be. With this the case, dealers and manufacturers represent themselves as sitting on the fence, waiting for developments. The large crops of fruits, hops, etc., are giving employment to more hands in the fruit growing and agricultural districts. There is also a steady call for more hands in several of the gold mining districts. This means more money going into distribution and an increase in the call for food products and wearing apparel.

In the local money market the supply of available funds continues in excess of requirements, although signs are not wanting of a call setting in soon for crop moving purposes. The receipts of gold bullion from the mines have been so far this year quite free—larger, if anything, than during the corresponding time last year. It is reported in well-informed circles that the output of the mines on this coast this year will show quite an increase over that of 1896. New York advices state that there is a speculative revival in railroad and industrial securities, with a marked advance in the price of the leaders. There is also a growing disposition at New York and Boston to embark in enterprises offering opportunities for fair returns on money invested. The rates of interest at New York still favor borrowers, although it is claimed that, with crops beginning to move, a steady demand would set in from the central States. Shipments of gold to Europe are light.

New York Silver Prices.

NEW YORK, June 10.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	27 9-16	60
Saturday	27 9-16	60
Monday	27 9-16	60
Tuesday	27 9-16	60
Wednesday	27 9-16	60
Thursday	27½	59⅞

	Copper.	Lead.	Iron.	Tin.
Fri.	10 75 @11 25	3 27½	10 00@12 00	13 55
Sat.	10 75 @11 25	3 27½	10 00@12 00	13 55
Mon.	10 75 @11 25	3 27½	....@....	13 55
Tue.	10 90 @11 25	3 27½	10 00@12 00	13 55
Wed.	10 90 @11 20	3 27½	10 00@12 00	13 55
Thur.	10 90 @11 20	3 27½	10 00@12 00	13 50

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	17½c Prem
New York Telegraphic Transfer	20c Prem
London Bankers' 60 days	$4.87
London Merchants	$4.85
London Sight Bankers	$4.88½
Refined Silver, per oz., 1000 fine	59⅞
Mexican Dollars	49

SILVER.—The market held to steady prices up to to-day, when it eased off at home and abroad. The European demand is slow, which shows itself when there is any selling pressure from this side. So many countries adopting the gold standard is restricting still more the employment of the white metal. This, naturally, is showing itself in the market value of silver. With accredited authorities it is asserted that if holders in the United States were to create a selling pressure the price of silver would go considerably below the lowest recorded figure. The mainstay of the market seems to depend largely on what the silver committee sent to Europe accomplishes looking to an international convention on the subject. The last steamer for China took out 187,000 ounces.

MEXICAN DOLLARS.—The market is easy at quotations. The last steamer for China took out 253,600 dollars.

QUICKSILVER.—The market values are unchanged. The demand continues fair. The last steamer for Mexico took out 115 flasks.

Our market is quoted at $40.50 for domestic consumption.

COPPER.—The market has held steady throughout the week. The consumption in Europe continues very heavy, while in this country it is increasing. The output of the mines continues large.

The local market is quoted as follows:

Ingot, jobbing	—@14
Ingot, wholesale	—@13
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17

TIN.—The market is practically unchanged, both at home and abroad. New business with us is slow, both in plates and ingots, owing to consumers running on old supplies.

We quote as follows in a jobbing way:

Pig, per lb	14c@ —
Plate, I C coke, heavy, per box	$4 00@ 4 15
" " " light, "	3 90@ —

LEAD.—The uncertainty regarding tariff legislation is against any movement in the market. Values hold steady.

Our market is quoted in jobbing lots as follows:

Pig	4 00 @ 4 25
Bar	— @ 4 50
Sheet	5 62½@ 6 12½
Pipe	4 87½@ 5 37½

SHOT.—There is a better jobbing demand. Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

POWDER.—The demand from the mines continues active.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

BORAX.—No change is reported, pending tariff legislation.

The market is quoted as follows:

Refined, in carload lots, in barrels	5
Refined, in carload lots in sacks	4¾
Powdered, in car lots	5
Concentrated, "	4½

IRON.—The market is hard to report correctly, although there seems to be a slightly stronger tone. Press telegrams state that there has been an improvement in the markets, but private advices do not as yet confirm it.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—There are about 170,000 tons of coal loading and afloat from Australia, of which quantity fully 155,000 tons have been placed. The market for both spot and to arrive is unchanged.

We quote as follows:

SPOT FROM YARD—PER TON.

Wellington	$8 00@— —
Greta	6 00@ 6 50
Nanaimo	6 50@ 7 00
Gilman	5 50@ 6 00
Seattle	5 50@ 6 00
Coos Bay	— —@ 4 75
Cannel	8 00@— —
Egg, hard	12 00@13 00
Wallsend	6 50@— —

TO ARRIVE—CARGO LOTS.

Australian	5 50
Liverpool Steam	6 25
Scotch Splint	— —
Cardiff	6 25
Lehigh Lump	9 00
Cumberland	13 00
Egg, hard	10 00
West Hartley	6 50

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

ANTIMONY.—The market is quiet.

Our market is quoted at 7¼@8¼c in a jobbing way. New York mail advices quote 7½c for Cookson's, 6⅞@7¼c for Hallett's and 6⅝@7c for [illegible].

NAILS.—The market is strong.

Wire, carloads, basis per keg	....
" jobbing, " "	$2 35
Cut, carloads, " "	....
" jobbing, " "	2 25

PLATINUM.—Very little doing.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC.—The market is firm at quotations.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady.

We quote in jobbing lots at 50 cents per pound for ingots.

Chemicals.

The market is practically unchanged. Both buyers and sellers do as little as possible pending tariff legislation.

SPELTER.—The market is quiet.

We quote our market in a jobbing way at 5 cents a pound.

BISMUTH.—The market is steady.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is steady.

We quote in a jobbing way at 70 to 75 cents per pound.

BONEASH.—There is nothing new to report.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

CAUSTIC SODA, 60%.—The market is slow at 3c per pound in a jobbing way.

SODA ASH, 58% (LeBlanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

HYPOSULPHATE OF SODA.—There is a slow demand at 2½c a pound from stores.

NITRATE OF SODA.—Market is quiet.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

SULPHURIC ACID.—The demand is light.

We quote in a jobbing way at 1½c per lb for 66%.

NITRIC ACID.—Our market is reported steady from store at 6½@7c per pound in carboys.

BLUE VITRIOL.—Our market is quiet.

We quote in a jobbing way at 4½c per pound.

The following illustrates the changes of the week:

Mining Share Market.

SAN FRANCISCO, June 10, 1897.

The market has continued to fluctuate down in the absence of strong support. While there is an absence of support, all indications point to steady concentration of the shares of the more promising mines. How long this will continue it is hard to say, for the moneyed pool is not given to giving their business, unless more money can be made by doing so. There can be no question that a good-sized deal can be made, for the general business interest of this country is on a better basis than for several years, while at the East a strong bull campaign has been inaugurated in railroad and industrial securities. Aside from that, the feeling prevails that, with the tariff out of the way, better prices and freer trading would follow in many lines of goods. A revival of speculation in Kaffir and Westralia gold mining shares in England is reported, which may possibly have a favorable influence on gold mining securities in this country; but this may not be felt only to a certain extent by the Comstock mining shares, owing to the ore of the mines running from 40 to 65 per cent silver. If the management of these mines should work on business principles the gold-bearing ore in that district, then a better result might follow. But perhaps they do not want a mining deal at present. The news from the mines, taken as a whole, is far from discouraging, and under ordinary circumstances would be promotive of higher prices for shares. The quantity of ore that is being shown in Chollar is on the Brunswick lode. The quantity extracted and milled each week and also the bullion returns ought to be convincing evidence that the shares on merit alone are worth more than they are selling at, but perhaps they are waiting results from the work now under way on the 500-foot and 600-foot levels. If the ore extends down and does not show a decrease in gold or width, then strong buying ought to follow. Active and promising work is being done in Con. Virginia and two or three other mines on the Comstock. The bullion return of Chollar for the month of May was $24,000 in gold coin.

The news from the Comstock continues to report more or less activity in the leading mines, with more favorable formation in one or two. In Alta they are still prosecuting work in a kill-time kind of way, which helps to eat up money, even if does not do much towards showing up ore. From Caledonia and Overman nothing new has come to hand. In the latter a few tons of ore are being raised. From Seg. Belcher we do not get anything new. In Belcher, it is stated, they are about ready to resume active operations on the 1200-foot level. Ore is still raised from another part of the mine. In Crown Point active work is continued on several levels. The work to the west in the surface level of Kentuck is continued jointly by Crown Point, Kentuck and Yellow Jacket. Nothing of importance has come to hand from it. The west crossdrift that is being run jointly by Confidence, Challenge and Con. Imperial is being pushed ahead. This crossdrift is being closely watched by mining men, for those contending that the west lode is clear and distinct from the old or Comstock lode believe that the crossdrift will find that the lode dips slightly to the west, and also that it is gold-bearing. In Alpha nothing new has come to hand. The work is reported to be confined to the 500-foot level. The crossdrift is to the west. At last advices the north drift in Bullion was in soft material. They ought to be near the Potosi line. More active work has been resumed in Potosi on the surface tunnel. Nothing of interest is reported in official letters. Work has not been resumed in Chollar. A change in the superintendency of Hale & Norcross has delayed work to some extent. From Savage nothing new has come to hand so far as work is concerned. There is no change in the joint work of Best & Belcher and Gould & Curry. The joint crossdrift is still to the east. Work is continued in Con. Virginia on the 1000-foot, 1550-foot and 1650-foot levels. On the 1550-foot level they are raising on a double compartment incline along the foot wall. At last advices one-half was in ore assaying from $4 to $20 a ton. The most active work is being done on the 1650-foot level, and which is being closely watched. They are doing considerable exploiting work, about all of which looks well. From this level there were extracted last week 92 tons of ore assaying by sample $56.48 per ton. In Ophir they are driving slowly ahead No. 3 west crossdrift on the 1000-foot level. On the Central tunnel they are still running a south drift. They pass through poor to fair material. On the 1000-foot level of Mexican they are still running the south drift from the northwesterly workings. From Union nothing new has come to hand. They are working in the various directions heretofore reported. There is a report of a slight improvement in the west crossdrift in Sierra Nevada that is being run on the Layton tunnel. As yet it is not calculated to set the world on fire, but it was enough to make short sellers fill and a few chronic bulls to buy long. No change is reported from either Utah or Andes.

From the mines on the Brunswick lode nothing new is reported in the joint work of Con. Virginia, Best & Belcher and Gould & Curry. They are still sinking shaft No. 2 and at the same time exploiting the 300-foot level. From Chollar the ore was cut off on the 13th floor above the 200-foot level. Above the 300-foot level the ore is pinching, while the grade is lower. Connection has been made with the upraise from the 400-foot level. This will admit of more active work on these two levels. On the 500-foot level they are still driving ahead on the main south drift. Hopes are entertained that the crossdrifts on this level will strike the downward continuation of the ore above. The south drift on the 600-foot level is in Chollar ground. In Occidental they are doing work on the 550-foot and 650-foot levels. So far as official advices go no material change has occurred the past week.

The following illustrates the changes of the week:

Mines.	June 3.	June 10.
Alpha	....	....
Alta Consolidated	....	....
Andes	....	....
Belcher	$ 17	....
Best & Belcher	50	$ 51
Bodie	....	....
Bullion	....	11
Challenge	24	....
Chollar	1 15	1 15
Confidence	....	....
Consolidated California and Virginia	1 75	1 70
Consolidated New York	....	....
Crown Point	....	....
Exchequer	....	....
Gould & Curry	37	35
Hale & Norcross	76	73
Justice	07	....
Mexican	31	....
Ophir	85	80
Overman	....	....
Potosi	66	66
Savage	29	....
Sierra Nevada	34	52
Union	28	35
Utah	....	....
Yellow Jacket	26	26

Under date of the 4th James A. Pollock writes from Salt Lake City, Utah:

Business in the local mining stock market was

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied.	Delinq't and Sale.	Secretary.
Alta S M Co, Nev	56	5c	May 21	June 25..July 16	J E Jacobus, 309 Montgomery
Bullion M Co. Nev	50	10c	May 4	June 8..June 28	R R Grayson, 331 Pine
Challenge Con M Co, Nev	23	10c	May 13	June 16..July 8	C L McCoy, Mills Bldg
Chollar M Co, Nevada	43	15c	May 10	June 15..July 8	C E Elliott, 309 Montgomery
Gould & Curry S M Co, Nev.	81	20c	Apr 29	June 1..June 22	Alfred K Durbrow, 309 Montgomery
Jamison M Co, Cal	9	5c	Nov 27	June 23..Aug 18	Sam W Cheyney, 130 Sutter
Marguerite G M & M Co, Cal.	6	10c	Apr 12	May 24..June 21	F Mettmann, 237 Twelfth
Occidental Con M Co, Nev	27	10c	May 11	June 12..July 1	Alfred K Durbrow, 309 Montgomery
Pine Hill G & S M Co, Cal	10	5c	May 10	July 1..July 22	Chas A Hare, 1003 Railroad Ave
Rock Island G & S M Co, Nev.	14	2c	May 20	June 25..July 6	W W Guptill, 309 Montgomery
Thorpe M Co, Cal	7	2½c	June 9	July 17..Aug 9	A F Frey, Phelan Building

WILL NEGOTIATE with owners or their duly authorized agents only.

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Marquette, Mich., U. S. A.

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Mines, Mining Properties and Mineral Lands,

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Assay and Chemical Work Done on Reasonable Terms.

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T. R. MILLER, Vice-Pres't. JOHN D. FLEMING, Counsel.

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not especially active during the week just closing, unless certain of the gold securities be again excepted. The somewhat uncertain future of silver is causing a continued depression in the silver-lead section, although prices there have reached a very low and consequently attractive level. Outside inquiry has been largely for the gold stocks, especially the dividend payers, and all of these have at least maintained their strength where they have not advanced.

Ajax was persistently beared with very light offerings. Regardless of the silver situation, it now looks very cheap. The mines are looking well, although only the highest grade gold-copper-silver ore is being extracted. Anchor was weaker and sold under the $1 mark. Bullion-Beck was not active and the tendency still continued downward. It is not at all likely that a dividend will be paid this month. The mines are looking slightly better on the deepest levels, but shipments are not heavy. Buckeye did comparatively little. Some nice ore is coming in from the properties, where the showing is reported to be highly satisfactory.

The continuous offering of several odd blocks of Centennial-Eureka on an already depressed and quiet market caused an added shading of open quotations. It is only the weak holders being weeded out, however, as the great majority of the stockholders are fully satisfied with the recently adopted policy of the management in refusing to sacrifice the ore reserves. Only light business was done in Dalton and prices remained unchanged. The Dalys were inactive and neither recorded any material change. An order to resume full operations at the Daly's mill has not yet been given. A steal of about $25,000 in bullion and cyanides was discovered at the Dexter. Several arrests were made. The stock did little and quotations remained unchanged.

Eagle's assessment of 25 cents per share is delinquent. The stock has taken up a portion of the assessment. East Golden Gate is absolutely without activity, and was offered at its lowest figure. Four Aces did but little business and that at unchanged quotations. Galena was shaded again somewhat on account of the continued delay in dividends. On the 1st Geyser-Marion paid its May dividend. There should be no interruption of payments, unless some catastrophe occurs. The cleanup made on the 3rd was the most satisfactory for the same length of time yet made by the company. At the mines the show is very flattering. The stock was active and, while no special advance occurred, great strength was displayed. Little Pittsburg was active but practically unchanged.

An increased inquiry for Mercur followed the reaction in price, and the stock regained much of its lost strength. The mill is operating to full capacity and the mines are making a splendid showing. Mammoth was again beared on very light business. Offerings are not heavy and a recovery should soon occur. The company is confining its efforts to the extraction of high-grade ore, and to new development work. Northern Light was active, but slightly lower. Two small cleanups have been made at the mill.

The regular dividend on Ontario has been paid. But little business was done in the stock and quotations were lower. More free offerings of Silver King shaded prices somewhat. The usual dividend is expected on time. Sacramento was several points lower, on a cessation of the buying movement. Swansea has just declared its June dividend, but fears of a delay caused the stock to decline somewhat. A slight recovery occurred at the close. South Swansea was also weaker. It is uncertain yet regarding the June dividend. An effort is being made to resume full operations at the Sunshine, either by the company or at the hands of leasers. Utah was comparatively strong, although the payment of dividends has not yet been resumed. This strength is due to the continued fine showing at the properties.

San Francisco Stock Board Sales.

SAN FRANCISCO, June 10, 1897.

9:30 A. M. SESSION.

200 Best & Belcher	49	100 Occidental	05
500 Bullion	11	300 Potosi	64
250 Challar	1 10	500 Sierra Nevada	48
500 Con Cal & Va	1 65	200 Union	35
200 H. & N	73	100 Yellow Jacket	26

SECOND SESSION—2:30 P. M.

700 Ophir	89	100 Potosi	66
300 Gould & Curry	35	500 Sierra Nevada	52
200 Best & Belcher	51	200 Occidental	05
500 Con Cal & Va	1 70	300 Scorpion	03
50 Challar	1 15		

Rainfall and Temperature.

The following data for the week ending 5 A. M., June 9, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week	Total Seasonal Rainfall to Date	Total Seasonal Rainfall to Same Date Last Year	Average Seasonal Rainfall to Date	Minimum Temperature for the Week	Maximum Temperature for the Week
Eureka	.00	49.74	51.90	45.54	44	60
Red Bluff	.00	24.16	22.43	25.72	64	104
Sacramento	.00	17.28	23.23	20.78	58	98
San Francisco	.00	23.22	21.25	23.99	49	83
Fresno	.00	10.53	8.18	7.45	58	104
San Luis Obispo	.00	20.74	17.72	.....	44	96
Los Angeles	.00	16.85	9.35	19.77	54	88
San Diego	.00	11.77	5.92	10.51	58	70
Yuma	.00	5.35	0.88	2.98	64	106

THE AIR LIFT.

We have just published an interesting

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describing and illustrating the "Pohle Air Lift" and other methods of

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Assessment Notices.

JAMISON MINING COMPANY. Location of principal place of business, San Francisco, California. location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 25th day of November, 1896, an assessment (No. 9), of 3 cents per share, was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction, and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office—Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 24th day of February, 1897 will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 26th day of March, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on SATURDAY, the 24th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 19th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of April, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on MONDAY, the 24th day of May, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 19th day of July, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of May, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on WEDNESDAY, the 23rd day of June, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 18th day of August, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

CHALLENGE CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Gold Hill, Nevada.

Notice is hereby given that at a meeting of the Board of Directors, held on the 13th day of May, 1897, an assessment (No. 23) of Ten cents (10c) per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, room 35, third floor, Mills building, corner Bush and Montgomery streets, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 16th day of June, 1897, will be delinquent, and advertised for sale at public auction; and, unless payment is made before, will be sold on THURSDAY, the 8th day of July, 1897, to pay the delinquent assessment, together with costs of advertising and expenses of sale.

By order of the Board of Directors.

C. L. MCCOY, Secretary.

Office—Room 35, third floor. Mills building, San Francisco, California.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—Location of principal place of business, San Francisco, California. Location of works, Silver Star Mining District, Storey County, Nevada.

Notice is hereby given that at a meeting of the Board of Directors held on the 11th day of May, 1897, an assessment (No. 27) of 10 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin, to the Secretary, at the office of the company, Room No. 69, Nevada Block, No. 309 Montgomery street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 12th day of June, 1897, will be delinquent, and advertised for sale at public auction, and, unless payment is made before, will be sold on THURSDAY, the 1st day of July, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

ALFRED K. DURBROW, Secretary.

Office—Room No. 69, Nevada block, No. 309 Montgomery street, San Francisco, California.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 9th day of June, 1897, an assessment (No. 7) of 2½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 17th day of July, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 9th day of August, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

Skeleton Mining Report.

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THE CALIFORNIA DEBRIS COMMISSION, having received applications to mine by the hydraulic process from Hoey & Lewis, in the Parsons Gravel and Timber Claim in Brownsville Mining District, El Dorado Co., to deposit tailings in Little South Fork of Cosumnes River, from Daniel McLaughlin in the Morristown Mine at Morristown, Sierra Co., to deposit tailings in the Morristown Ravines; from Henry Northrop and Robert C. Nicholson in the Etta Placer Mine near Sierra City, Sierra Co., to deposit tailings in North Fork of Yuba River; and from J. P. West, in the Mountain View Mine near Coutolene, Butte Co., to deposit tailings in Little Butte Creek, gives notice that a meeting will be held at room 59, Flood Building, San Francisco, Cal., on June 14, 1897, at 1:30 P. M.

In the Superior Court of the City and County of San Francisco, State of California, Department No. 8. John V. Kimball, plaintiff, vs. Mabel L. Kimball, defendant. Action brought in the Superior Court, City and County of San Francisco, State of California, and the complaint filed in said City and County of San Francisco in the office of the clerk of said Superior Court. The people of the State of California send greeting to Mabel L. Kimball, defendant. You are hereby required to appear in an action brought against you by the above-named plaintiff in the Superior Court, City and County of San Francisco, State of California, and to answer the complaint filed therein within ten days (exclusive of the day of service) after the service on you of this summons, if served within this county, or, if served elsewhere, within thirty days. The said action is brought to dissolve the bands of matrimony now existing between yourself and plaintiff, on the ground of habitual intemperance on your part for more than one year past. All of which will more fully appear in the complaint on file herein to which you are hereby referred. And you are hereby notified that if you fail to appear and answer the said complaint, as above required, the said plaintiff will apply to the said Court for the relief prayed for in the complaint. Given under my hand and seal of said Superior Court at the City and County of San Francisco, State of California, this 9th day of April, in the year of our Lord one thousand eight hundred and ninety-seven. C. F. Curry, Clerk. By Joseph Riordan, Deputy Clerk. R. Thompson, Attorney for Plaintiff.

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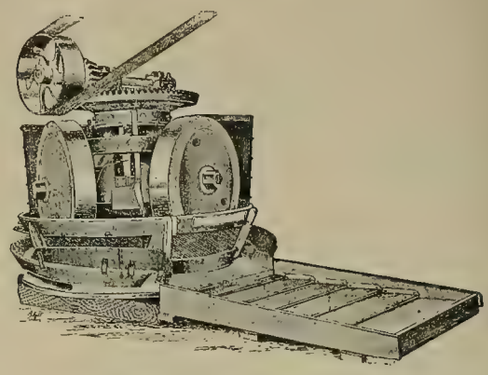
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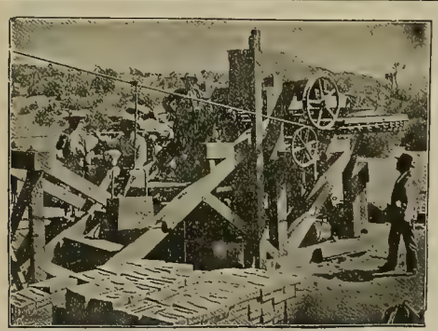
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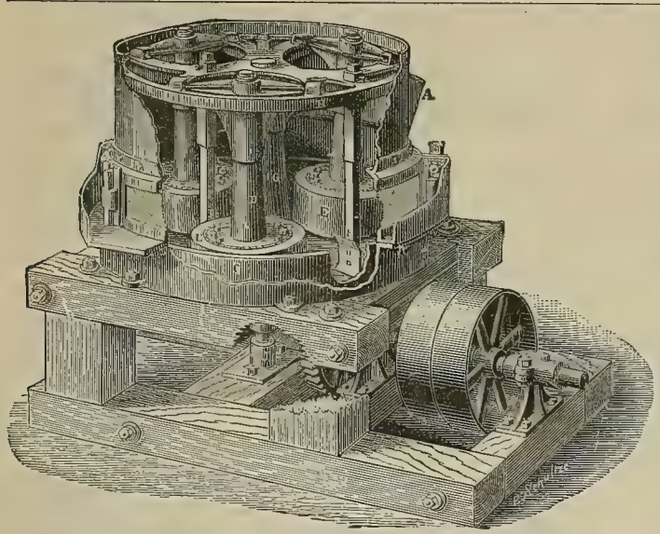
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State Library

This Paper not to be taken from the Library

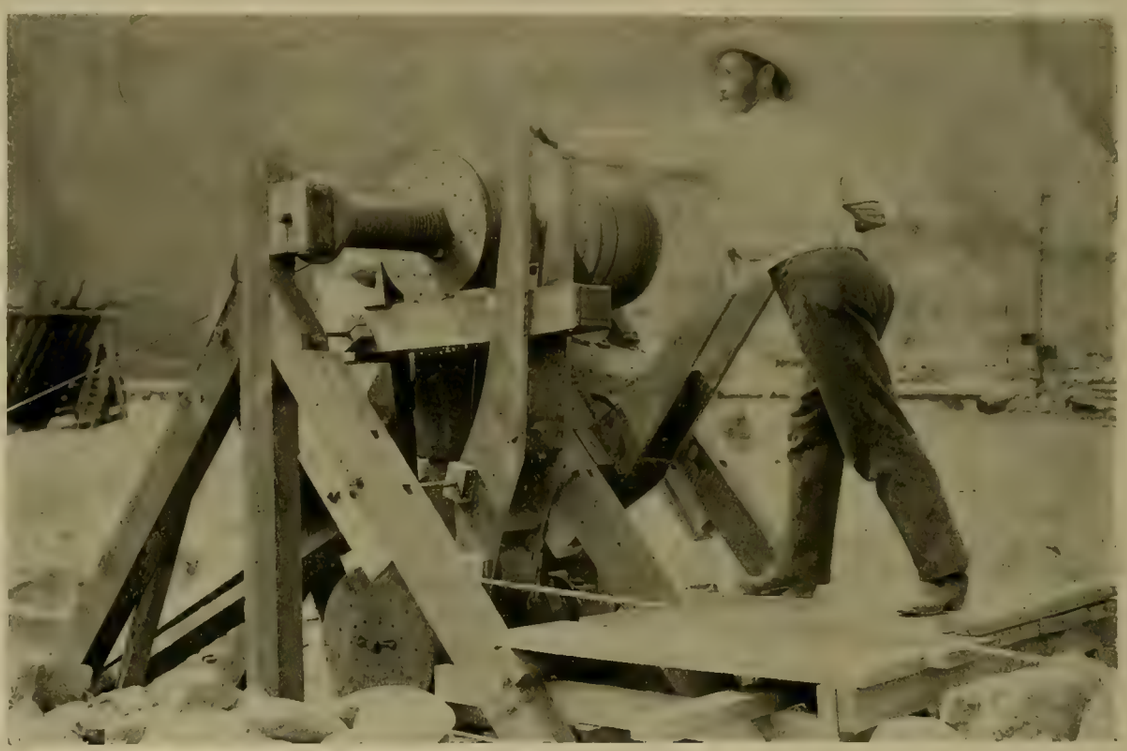
MINING AND SCIENTIFIC PRESS.
AND PACIFIC ELECTRICAL REVIEW.

No. 1928.—VOLUME LXXIV. Number 25. SAN FRANCISCO, SATURDAY, JUNE 19, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

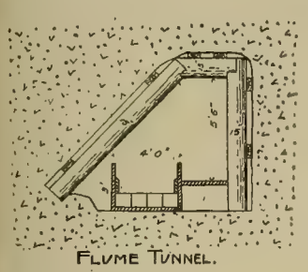
Novel Appliances for Hydraulic Mining.

Derricks are used generally to handle the large boulders in hydraulic mines in this State, and in many cases expensive rigs have been put up capable of handling rocks weighing several tons each. Derricks are especially necessary in those mines where the gravel is worked with hydraulic elevators. In the old Hayes and Pickett mine, opposite Junction City, in Trinity county, California, owned by the Compagnie Francaise des Placers Hydrauliques, the banks are so high that derricks cannot be made use of to remove the boulders without great danger of their being covered up and destroyed. For a time blasting was resorted to, but the outlay for powder and labor was very heavy. Besides that, the sharp edges of the pieces caused a rapid wearing away of the wooden blocks with which the flumes were paved.

In order to reduce these expenses the manager, E. Saladin, devised an ingenious system of blocks, cables and a carrier or trolley to remove these boulders from the face of the bank. This has been in use for over a year and is doing good work. The plant is illustrated on this page. Boulders weighing as much as two tons are picked up and removed to the back end of the pit. The usual method of timbering the bedrock tunnels for the sluice boxes has been changed somewhat, in order to reduce the amount of excavation and yet furnish enough height for the workmen to walk along the flume.

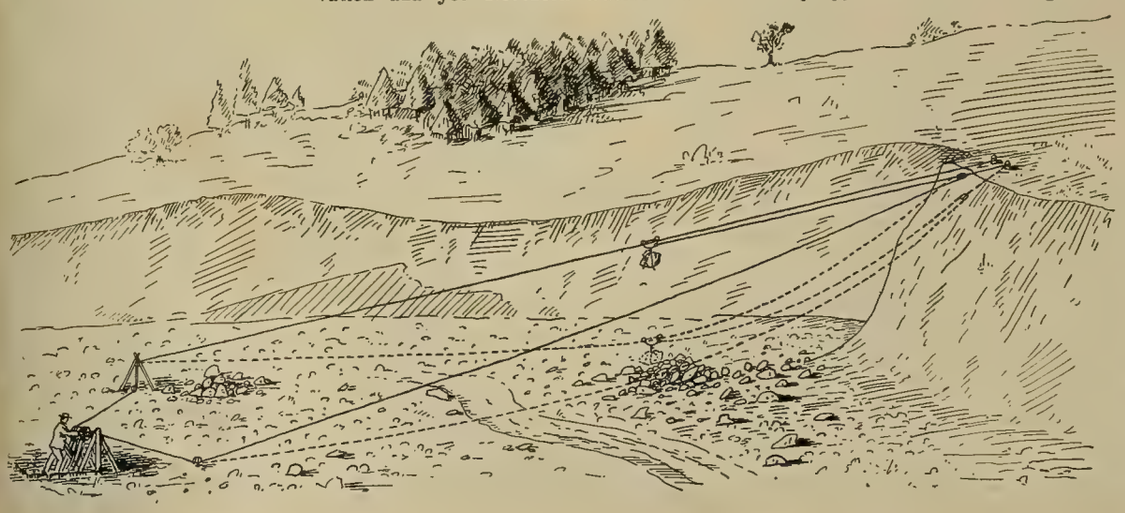


CONVEYOR REELS OF CIE FRANCAISE DE HYDRAULIC.



FLUME TUNNEL.

The mine has a supply of 6000 miners' inches of water, which keeps half a dozen large giants in use. The company owns its own sawmill and has telephones and electric lights on the property.



ROCK CONVEYOR – COMPAGNIE FRANCAISE DES PLACERS HYDRAULICS.

The Land Office and Petroleum.

An effort is being made before the Secretary of the Interior to induce him to reverse the ruling of the General Land Office, made last year, to the effect that petroleum lands were not mineral. Commissioner Lamoureux, in the case of Aldritt vs. the Northern Pacific Railroad Company, ruled that while the department had from time to time allowed entries to be made for rock, chalk, kaolin, gypsum and petroleum as placer claims, they were allowed under a strained construction of the statute. This decision works a particular hardship in this State, where so much petroleum land is within the limits of the railroad land grants. The decision of the commissioner narrows the right of placer locators to such lands as contain metalliferous ores only. For the purpose of taking up and developing such deposits as were excepted by the ruling there was no more fair and convenient method to be devised than under the mineral land act. It would certainly not be logical to take them up as agricultural lands, nor would it be right to allow the railroads to obtain them as if they were agricultural lands. Certainly, if the public have no right to locate them that does not in itself give the railroads any title to them.

THE California delegation in Congress is asking that a duty of about $6 per ton on mineral paint be included in the proposed tariff act. While there is obtained all over this State mineral paint of good quality, it has been found unprofitable to work. The president of the Healdsburg paint mine, which is the principal producer, stated last week that they were starting up again in anticipation of tariff legislation. The red paint, he said, is equal to the best imported, but could not compete in price with Venetian red from Europe.

MINING AND SCIENTIFIC PRESS.

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TO THE PUBLIC.

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San Francisco, June 19, 1897.

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Removal.

Increasing business renders necessary more and better office room. Accordingly, the sixth floor of the fine new building, 330 Market St., has been leased, and after July 1st, '97, that will be the home of the MINING AND SCIENTIFIC PRESS. The new building compares favorably in every way with the modern buildings now being erected. The paper has outgrown its present quarters, which have been occupied for nearly twenty years. It is designed that even more than in the past this office shall be headquarters for mining information, and mining men resident or visiting the city are invited to make use at any time of its facilities.

The MINING AND SCIENTIFIC PRESS Patent Agency, long and intimately associated with this paper, also transfers its offices adjoining those of the paper. It is, of course, well known that the patent agency in the firm name of Dewey & Co. is under the personal administration of Mr. Geo. H. Strong, whose experience and ability have ever been manifest in successfully conducting that branch of the business.

The Denver Convention.

The international Gold Mining Convention to be held in Denver, Colorado, next month, gives promise of being a success from the point of view of the miners themselves. That it will be primarily a miners' convention and not a political convention nor a stock-jobbing gathering seems assured. It is the desire of the committee in charge that all papers read and all discussions be confined to those subjects which are germane to mines and mining, and that the convention shall in no sense be partisan.

The delegations thus far appointed from the different States and Territories and from outside the limits of the United States assure a large attendance. The Governor of California, the California State Miners' Convention and the various county miners' associations have appointed representative miners who have announced their intention of attending the convention.

The future of the mining industry in the West can be very much improved by annual conventions if this first starts off right and under proper auspices. The management must now and in the future be kept free from the baneful influence of stock jobbers and politicians.

The good work that has been done by the California Miners' Association is an indication of what may be done in a larger field by the International Gold Mining Convention. While many questions of legislation affecting the industry will be most apparent in the deliberations, probably from an educational point of view will the gatherings of miners be of most importance in the end. Gold mining, and, indeed, silver and copper mining, as industries, are yet crude in many respects. Much has been done toward improving methods during the past few years, but the great changes constantly going on show that much more is to be learned. Nearly every district has new methods, unknown to others, and a meeting of the best miners from these different districts should do much good.

Mineral Lands Patented by the Railroads.

The chairman of the Mineral Lands Committee of the California Miners' Association, Mr. A. H. Ricketts, has prepared the following statement:

In view of the recent announcement that a committee had been appointed by Congress to investigate the matter of issuing patents to the subsidized Pacific Coast railroads, the following figures, taken from reports of the late Commissioner Lamoreux as to the disposition of the public lands lying within the limits of the several railroad grants, is of more than passing interest:

On July 30, 1894, the estimated area in grants to the Central Pacific Railroad Company in Nevada, Utah and California was 7,997,600 acres; to the California and Oregon Railroad Company, in California, 3,724,800 acres; to the Western Pacific Railroad Company, in California, 1,100,000 acres; to the Oregon and California Railroad Company, in Oregon, 3,884,000; to the Southern Pacific Railroad Company, in California, 11,964,160 acres; or a total of 28,626,560; of which, says the Commission, "it has been estimated by the best authority obtainable that one-third of the land within the railroad grant in the twelve mineral States and Territories is mineral land." Acreage patented in the above-named States up to July 30, 1894: 7,829,213.73. Up to June 30, 1896, the acreage patented to the Central Pacific and its associates of lands lying in the above-named States was: In California, 7,092,183.87 acres; in Nevada, 755,338.89 acres; in Oregon, 2,180,366.07; in Utah, 849,294.18 acres; or a total of 10,877,183.01 acres. Assuming these figures to be accurate, and they are compiled from the official reports of the General Land office, it appears that in twenty-three months the Central Pacific Railroad Company and its associates have received patents for 3,047,969.28 acres, of which one-third, or, say, 1,000,000 acres in round numbers, was mineral land and excluded by act of Congress from the grants, or, in all, say, 3,500,000 acres have, under the estimate of the Commissioner, been given to the railroad company in defiance of the act of Congress.

These figures are startling in the extreme and show an unwonted industry upon the part of the Central Pacific Railroad Company in seeking patents since the action of the California Miners' Convention of 1894, out of which grew the appointment of its mineral land committee and the presentation to Congress of the mineral land bill. The fate of this bill, because of the arbitrary action of Speaker Reed, is still fresh in the minds of the community. A similar bill has been introduced at the present session, and unless its progress is forced there will be but little work for the committee to do, that is, if the past is an earnest of the future. The necessity for prompt action is emphasized by the following detailed statement of railroad lands patented in California during the fiscal year ending June 30, 1895:

	Acres.
Central Pacific	109,293.97
Central Pacific (successor to the California-Oregon Railroad Company)	306,692.81
Southern Pacific (main line)	616,728.38
Southern Pacific (branch line)	72,548.01
A total of	1,035,263.17

And for the fiscal year ending June 30, 1896:

Central Pacific (successor to Western)	1,345.15
Central Pacific (successor to the California-Oregon Railroad Company)	1,114,213.14
Southern Pacific (main line)	220,610.78
Southern Pacific (branch line)	39,746.22
A total of	1,376,516.29

Or a grand total in this State alone of 2,412,779.46 acres patented within the two years during which the mineral land bill may be said to have been pending before Congress.

In addition to this amount, there was pending in the General Land Office, June 30, 1896, unpatented railroad selections in California amounting to 1,058,629.92 acres; but how much of this land has since been patented to the railroad company I have no present knowledge, but it is quite possible that all of it has been patented to it.

As all mineral lands lying within the several railroad grants are excluded therefrom, it is apparent that the lands patented to the railroad company have been determined to be non-mineral in character. In the case of Barden vs. Northern Pacific (104 U. S. 331), Mr. Justice Field, in delivering the opinion of the court, says: "A patent issued in proper form upon a judgment rendered after a due examination of the subject by officers of the Land Department, charged with its preparation and issue, that the lands were non-mineral would, unless set aside and annulled by direct proceedings, estop the Government from contending to the contrary; and, as we have already said, in the absence of fraud in the offices of the Department would be conclusive in subsequent proceedings respecting the title."

The examination as to the character of the land, which is the duty of the Land Department, has been notoriously perfunctory in character, and particularly so since the adoption of the rules of July 9, 1894, concerning which it has been said by W. W. Dixon, one of the counsel for Barden: "I do not wish to misrepresent the regulations of the Secretary. They provide for protests and contests against the classification of lands by the railroad company, but under such conditions and restrictions as will in most cases make opposition useless. I do not believe that the railroad company itself could devise more effectual means to enable it, in the teeth of the decision of the Supreme Court, to get title to large tracts of mineral land, than these rules and regulations, if put into practical operation, would afford. I say this without disrespect to the Land Department, or any imputation upon its good intentions. The Department seems to consider the subject as of importance only to the railroad company and adverse mineral claimants, not regarding the interest of the Government in the mineral lands and its duty to see that they are preserved to the people."

County and District Recorders.

Some correspondence in reference to some phases of the new mining law has been handed to the MINING AND SCIENTIFIC PRESS, and is of particular interest to the local mining districts. A firm in this city was asked by one of their correspondents in Bodie the following questions:

"First—What about the right of the Legislature *abolishing* the office of *Mining Recorder* and transmitting records to County Recorder? Under Section 2324, Revised Statutes of the United States, privilege is granted and always recognized that miners have the right of electing a Recorder and recording their claims in the district, which law has been *in force and recognized in Bodie mining district* upwards of *twenty-five* years. Second—Can the Legislature *legislate* an officer out of office for the term for which he was elected? Mining Recorders are generally elected for one year, from January 1st to January 1st succeeding. The records and seal are purchased by the Mining Recorder and have always been considered the property of the mining district. The last mining law also fails to provide a penalty for failure to transmit mining records to County Recorders. The general opinion of mine owners and miners here is that the above part of the law is clearly unconstitutional."

These questions submitted to J. F. Cowdery elicited the following reply:

"Notwithstanding the act of March 27, 1897, I think the miners of a district have a right to meet and adopt rules and regulations not in conflict with the State law and the laws of the United States. They may add to the State law a rule that notice of location shall state whether the lines of the location are parallel to or about, upon a claim already located, the character of the ledge, or, in case of placers, whether the claim is in a river, on a flat or on a seashore and the like. As to the place where a notice is to be recorded, I think the miners of a district have no right to require a notice to be recorded at any place other than the County Recorder's office nor by any other person than the County Recorder; and this because the United States mining law permits the miners of a district to make laws not in *conflict* with the laws of the United States *or* with the laws of the State or Territory where the mine is situated. The State, by the acts of March 31, 1891, Sts., page 219, and the act of 1897, has directed the aforesaid notices to be recorded in the County Recorder's office, and that direction is final. If I lived in a mining district I would advocate the holding of a miners' meeting and I would also advocate the passage of a resolution abolishing the office of District Recorder and requiring all locations to conform to the California law of March 27, 1897. If this is not done, a locator may (in contested cases) have trouble in proving his location; or, if he applies for a United States patent for his mine, he may have trouble. I think the Legislature had a right to anticipate that miners would do substantially as above indicated, and that District Recorders would turn over their books of record to the County Recorder. Section 74 of our Penal Code provides that every person who intrudes himself into a public office is guilty of a misdemeanor, and Sec. 76 says that 'Every officer whose office is abolished by law, who withholds or detains from his successor the records of his office, is guilty of a *felony*.' I am inclined to the opinion that the office of Recorder for a mining district was abolished by the act of 1897 and that a Recorder under the old law will be liable if he refuses to obey the new."

Concentrates.

THE Spokane Mining Stock Exchange has been closed for the summer.

THE cyanide plant at the Eureka mill, Lyon Co., Nev., began operations this week.

THE owners of the Fern mine at Nelson, B. C., are preparing to erect a 20-stamp mill.

ARGUMENT continues in the Senate over the proposed duty on lead ore of 1½ cents per pound.

IN Hungary there are in operation 62 gold mines, 23 silver mines and 13 gold and silver mines.

P. A. BUELL and others of Stockton, Cal., say they will build a smelter there to cost $250,000.

BRITISH COLUMBIA can boast in Grand Forks of a mining town in which saloons are not allowed.

CONSIDERABLE ore is hauled from mines to reduction works in Butte, Montana, over the street car lines.

THE Standard mill at Bodie has shut down. It will be refitted and probably started up again within a month.

THE railway bills for transportation of troops in connection with the Leadville, Col., strike of last year amount to $20,109.

THE Yankee Doodle on Carbonate Hill, Leadville, Colo., has been sold to an Eastern syndicate. The price is about $100,000.

THE Hall Mines Co., Limited, of London has bonded the Black Cock mine in the Salmon river district, B. C., for $70,000.

THE Anderson mine, in the Parrot addition, Butte, Montana, has been bonded and leased to the Butte and Boston Company for $75,000.

AT the onyx quarry at Big Bug, Ariz., twelve men have been put to work and machinery is being ordered to handle a large output.

A REPRESENTATIVE of Chicago capital has begun work to develop copper deposits in the big bend of Pitt river in Shasta county, Cal.

THE Maggie Jerome Mining and Milling Company propose to erect a mill immediately on their property at Jerome Creek, Idaho.

A PROJECT is on foot to supply Deep creek, Utah, with 1500 horse power, to be generated by waste water, to supply the mines and mills.

PREPARATIONS are being made to add enough tanks to the Mercur mill at Mercur, Utah, to bring the tonnage treated up to 350 tons a day.

BRITISH GUIANA from January 1 to May 10, 1897, exported gold valued at $611,919, against $566,282 for the corresponding period of last year.

C. D. LANE is reported to be arranging a plan to divert the waters of the Carson river, Alpine Co., Cal., to the Pine Nut, Nevada, mines.

THE owners of the Cleveland mine at Sierra City, Cal., are about to build a 10-stamp mill to take the place of the one recently destroyed by fire.

AT THE Mexican mine in Sonora, Mexico, there is a check system in use to prevent drunkenness among the men. Only three drinks a day are allowed.

THE United Verde Copper Company at Jerome, Ariz., is shipping a large amount of machinery. Last year they doubled the capacity of their plant.

THE American expedition which has been exploring in Tierra del Fuego has been successful in finding gold in quantities which will yield a large profit.

INVESTIGATIONS by experts on Piney creek near Buffalo, Wyoming, have led to filing on lands which contain a semi-anthracite said to be of good quality.

A NEW YORK capitalist has purchased the San Xavier, Arizona, copper mines. These properties were located some forty years ago and contain extensive ore bodies.

B. A. CARDWELL has twenty-five men at work building a wagon road from Cisco, Cal., to the Meadow Lake mines, over which to haul the refractory ores of the district.

THE fish commissioner of Colorado is trying to make the mill men, sluice and quartz miners in the vicinity of Aspen impound their debris in the interest of the trout.

THE mill at the Plymouth Rock mine near Milton, in Calaveras county, Cal., has been closed down temporarily preparatory to making some large additions to the plant.

THE Guggenheims, the owners of the Aguas Calientes smelters in Mexico, have purchased for $150,000, Mexican, a copper mine south of Jimenez, State of Chihuahua.

THERE will be an extra 6000 copies of next week's issue—that is, in addition to the regular number of copies, there will be an additional 6000 copies of the issue of the 26th inst.

IN the Julian mining district in San Diego county, California, there are nine quartz mills with a total of ninety stamps. Three mills are running and twenty mines are being worked.

THE United States Supreme Court has decided that all the mineral belt of the Cochiti mining district in New Mexico is outside of the Canada De Cochiti grant and on the public domain.

THE business part of Georgetown, California, was almost wholly destroyed by fire last Sunday night, and by an explosion of powder two people were killed. The loss is estimated at $125,000.

ON a claim taken up prior to May 25, 1897, under the old law or on or after January 1, 1897, the locator will have until January 1, 1899, in which to do the first $100 worth of assessment work.

THE Golden Cross mine, Hedges, San Diego county, Cal., for which $1,000,000 was recently refused, is reported bonded for $1,500,000 to Messrs. Carman & Rogers, representing New York men.

IT is believed that, by the close of this century, the demand for gold, great as it is, will be exceeded by the demand for copper. Copper will be king in the sunrise years of the twentieth century.

AT Cochiti, New Mexico, a miners' protective association has been formed, the object of which is to bring about arbitration in cases of conflictions or disputes affecting mining claims in the district.

THE company which has contracted to work the tailings of the Holmes Mining Company at Belleville, Nev., is the Northern Belle Mining Co., Limited, of London. The plant will be in operation in a few days.

FOR May the Alaska-Treadwell reports as follows: Period since last return, 30 days; bullion shipment, $40,928; ore milled, 26,383 tons; sulphurets treated, 295 tons. Of bullion there came from sulphurets $10,597.

SEVEN teams entered a rock-drilling contest at Baker City, Or., on the 11th inst. Chisholman and Pherson of the Rachael mine won, drilling 23¼ inches in 15 minutes; Ashton and Ash of the Con. Va. second, 20⅜ inches.

THE Texas Consolidated mine in Old Diggings district, Shasta county, Cal., has been closed down this week owing to closing off the water supply from the well. A suit between the owners and lessees of the water is the cause.

J. D. LODER, who has bonded some claims at Gold creek, states that he will build a pyritic smelter at Elko, Nevada, if an examination of the country surrounding justifies the estimate that it will contribute 150 tons of ore daily.

LEADVILLE, COLO., advices are that a New York syndicate has purchased the Yankee Doodle property on Carbonate Hill for $100,000. It has a record of about half a million in production of ore, and it is expected to be producing 200 tons daily by August.

PATRICK CLARK and associates have paid $105,000 for one-third of the stock in the Republic Mining and Milling Company which owns a free-milling gold property in the Colville reservation, Washington. This is a new mine, practically undeveloped.

AT the annual meeting of the Nobel Dynamite Trust Co. in London lately it was stated by the chairman that in order to protect the trade in the United States they were considering the advisability of establishing factories both in the East and the West.

IT is reported that the Blair group of mines at Silver Peak, Nevada, has been sold to J. B. Haggin, Marcus Daly and J. B. Conda, son-in-law of the owner, John W. Mackay and George D. Roberts, upon a report made by James D. Hague and Alexander Womble.

THE Le Roi Mining Company of Rossland, B. C., has purchased the machinery for its smelter. The purchase price was $25,000, and it is to be erected within seventy days. The site has not been chosen, but it will probably be erected at Rossland or Northport.

THE question whether one man may take up several contiguous mining claims in his own name is asked almost daily. He may. It does not make any difference whether they adjoin or not. He must see that $100 worth of work or improvements is put on each claim annually.

CAPTAIN J. R. DELAMAR, who owns a half interest in the Brickyard mine at Mercur, Utah, has secured an option on the other half, and is said to be making an offer for the Gold Dust and the Mercur. He controls the Golden Gate and has purchased the Gold Belt Water Co.'s line.

AT a meeting of the directors of the El Dorado county Miners' Association last week, called to take action in reference to restraining dams, a committee consisting of the president, H. E. Pickett, and Thomas Alderson was appointed to ascertain the best location for such dams.

THE owners of the copper and mineral paint mines at Spenceville, Nevada county, Cal., have contracted to furnish one of the powder companies with 500 tons of low-grade ore from which to obtain sulphuric acid. If this experiment proves satisfactory, there will be considerable required.

THE first steam dredger to work for gold on this coast was shipped out here from the East and went up the Sacramento river in 1849. After a short trial it was found that nothing could be made in that way and the boat was used to carry freight on the upper waters of the Sacramento.

THE shipments of ore from Trail Creek, B. C., camp for the first five months of 1897 have aggregated 24,350 tons, as follows: Le Roi 17,056, War Eagle 4740, Iron Mask 1414, Columbia & Kootenay 519, O K 172, Jumbo 91, Josie 140, Cliff 101, Red Mountain 56, Evening Star 21, Giant 21, I X L 12.

FROM the Kootenay, up to June 5, the exports of ore amounted to 21,162¼ tons, valued at $1,511,438.06, an average of $71.42 per ton. In addition to this the product of the Nelson and Trail smelters was valued at $1,581,592.04, making the total output of the mines for 1897 to June 5 $3,093,030.10.

SUIT has been brought by the Mountain Copper Co. against O. H. Garlock & Co., at Redding, Cal., to determine the ownership of adjacent water rights. The latter were using some of the water in generating electric power to run their mines, which are now shut down awaiting the outcome of the litigation.

THE district recorder at Virginia Dale, San Bernardino county, Cal., refuses to turn his books over to the county recorder without an order of court. This may bring up a test case on the new California mining law, which abolishes district recorders and requires records of mining locations to be made with county recorders.

HAMILTON SMITH and his associates have bonded the property of Mrs. Frederick McCrellish for $125,000 and that of Alfred Wertenweiler for $100,000. These claims adjoin and are near the southern boundary of the Mariposa grant, in which Smith and his associates lately bought a one-sixth interest from Alvinza Hayward.

THERE is some stir in southern Oregon over discoveries of quartz on the headwaters of Elk creek, about forty miles north of Medford, and many people from that and other towns have gone to the scene. The mines are reported to cover a territory five miles by ten. The formation is said to be a blanket under a covering of lava.

SINCE the refusal of the Southern California Railroad to pay over $1 a barrel for oil at Los Angeles producers have been disorganized. Last week, however, the producers in the field in Los Angeles perfected a closer organization and entered into an agreement to ship 10,000 barrels, but they refuse to say when it is to be shipped.

AT a rock-drilling contest in Helena, Mont., on the 13th inst., Davy and Freethy of Butte won first money, drilling 41 15-16 inches in fifteen minutes; the same team made a record of 39 inches in Spokane, Wash., last year. W. Bieber of Lump Gulch, Mont., single-handed drilled 15⅝ inches in ten minutes. There were 1000 miners on the ground.

A PECULIAR freak was played by lightning at the Silver King mine at Park City, Utah, last week. A bolt first struck and shattered the flagstaff at the entrance to the main shaft, after which it ran down the shaft on an air pipe to the 800-foot level. At this point it struck a drift which it followed for a distance of 400 feet, knocking down a miner who was loading a car.

SEVENTY-FIVE years ago some Indians brought from the State of Guerrero, Mexico, specimens of what they called "crystal chips," and presented them to Gen. Vicente Guerrero, who discovered that they were valuable diamonds, and which were equal to the best Indians from Golconda. Traces of the beds were lost, and it is now believed that they have been found again.

THE Escondido mines in San Diego county, California, have been sold to the Du Quesne Gold and Silver Mining and Milling Company, principal office at Pittsburg, Pa. The company also owns and operates mines at Ames, Colo. These mines were discovered thirty-six years ago and work has been done on them by several companies. The new owners will begin extensive development work at once.

A SMELTER is to be built at Seattle, Wash., according to a dispatch, which says that specific terms have been agreed upon between leading citizens of that city and the representatives of a Milwaukee, Salt Lake and Portland syndicate, whereby the latter is to expend $400,000 in the establishment of a smelter and refining plant in Seattle. It is announced that work will commence within thirty days.

AT a recent meeting of the Executive Committee of the California Miners' Association a report was made of the progress of work among the county associations. President Neff appointed delegates to the International Gold Mining Convention at Denver, Col., and the Trans-Mississippi Convention, Salt Lake City, Utah. A committee was appointed to confer with a like committee from the valley regarding co-operation in the matter of river improvement, etc.

UNDER the agreement between the Canadian Government and the Canadian Pacific Railway, in regard to the terms on which the Crow's Nest Pass road is to be built by the latter, there is to be no monopoly of the coal fields, the road giving 50,000 acres to the Government. Then the price of coal must not exceed $2 per ton f. o. b. cars, and in the third place the railroad cannot make a profit of over 75 cents a ton on coal. This will reduce the cost of coke at Rossland one-half and coal two-thirds.

IN one or two sections of Colorado "restriction" of the ore product is suggested, with the curious argument that the building of mills is being overdone and that it may occur that there will ultimately be more mills than there is ore. If such be the possibility, it were better to curtail the mill building rather than the ore production, but with the admirable Colorado system of railroad distribution such glut is unlikely. It is one of the things that regulates itself. So far, the ore product has kept ahead.

THE mining companies of Butte, Montana, have made reports of net proceeds for 1896, showing a total twice as large as for 1895. They are as follows for the leading mines: Anaconda, $4,375,010; Boston & Montana, $2,630,470; Montana Ore Purchasing Co., $160,000; Butte & Boston, $86,895; Colorado Co., $48,975; W. A. Clark's eight mines, $35,870; Alice Mining Co., $40,025; P. A. Largey, $2810; J. A. Murray, $2635; Arlington Mining Co., $1760; Lexington, $1115; Moulton Mining Co., $935; total, $7,386,700. Total for 1895, $3,634,595.

WITH the mills now in course of construction or arranged for, and those being enlarged, the total milling capacity of Cripple Creek will in a short time be 1250 tons per day. These will work low-grade ores which are now not handled, and it is claimed that with the continued shipments of high-grade ores to the smelters the output of the district will be doubled, or brought up to about $20,000,000 a year, provided the mines will supply the ore. At present the mills cannot handle the ore now offered, and with increased and cheaper milling facilities no doubt many new producers would be developed.

THE British Columbia Legislature has authorized the formation of four electric light and power companies, the Pend d'Oreille Power & Light Company to take 200,000 miners' inches of water from Pend d'Oreille and furnish light and power to any part of East Kootenay, the East Kootenay Company to furnish light and power to Rossland and Trail, the Cascade Company covering the unsecured rights within a radius of forty miles of Grand Forks, including 150,000 inches from the Kettle river at the falls, and the Kootenay Company. This latter is empowered to supply power and light by compressed air and electricity to all Kootenay, and can use the water in the Columbia and Kootenay rivers.

THE importance of accuracy in every step in securing legal title to mining property is illustrated in the contest over the Hull City placer of 130 acres on which the townsite of Independence in the Cripple Creek, Colorado, district is located, and which is rated in value at from $1,000,000 to $5,000,000. Validity of the patent issued to the placer claimants is assailed on the one point of whether or not $500 worth of work was put upon the ground as required by law to be done before the patent issues. The protestants previously carried the case, on decisions adverse to them, up through the General Land Office at Washington to the Secretary of the Interior, who allowed the case to be reopened on the one point mentioned above.

THE report of the Great Boulder Proprietary Gold Mines of Western Australia for 1896 shows that the receipts from the mine were £223,705, and the expenses £46,777, leaving a balance of £176,928, from which dividends to the amount of £160,000 were paid, being 100% on the stock. There were in all 16,729 tons of ore from the mine treated during the year, and 55,949 ounces gold obtained. At the value given this was equal to 52,592 fine ounces, or 3.14 ounces per ton worked. The average return per ton worked was therefore $65.07; while the expenses reported were: Mine, $5.25; mill, $5.27; general, $3.11; total $13.63 per ton. This leaves a profit of $51.44 per ton worked. During the year 5,616 feet development work were done, and the manager reports 49,653 tons of ore opened up and in sight.

SENATOR GEO. C. PERKINS reports that the Mineral Land bill (which was reported favorably by the Senate committee to which it was referred) has not yet been presented to the Senate for action thereon. At this special session of Congress it was agreed by managers of the Administration policy that nothing but tariff and currency measures should be considered. In the House of Representatives members are playing chess by telegraph with members of the British House of Commons. An exciting international game of checkers is next in order. In the Senate the tariff bill will, it is hoped, be voted upon after awhile. The only way the California Mineral Land bill can get before the Senate is by unanimous consent. Both California Senators stand ready to do all possible to further the passage of the bill, but there is very little show of present success. Probably by the time the lands in question will have been mostly absorbed by the railway corporation the bill may pass in an emasculated form.

Precipitation of Gold from Cyanide Solutions.*

Paper read by L. EHRMANN.

Extraction of gold from cyanide solutions is of such importance that we may say it is nearly the capital subject of communications to our society. The zinc process has been in great favor on account of its simplicity, and very successful in general practice; but there are cases when either it is to be considered too slow or the percentage of gold extracted from the solution too low. There is the reason why, principally with poor solutions, electrolytic process is used, when the simpler method of zinc boxes seems ineffective. There is no doubt that electrolytic processes for extraction of metals from solutions are, scientifically speaking, the best, as they can be regulated; but they require more care and technical knowledge than the ordinary zinc process. Electrolytic process can be made more simple if electrolysis of the solution is produced in the zinc boxes, by contact of two different metals, instead of being produced by an external source of electricity. The question of elevation of the temperature, so as to facilitate the chemicals' reactions to make them more complete and rapid, is also of extreme importance, and seems to have been generally neglected. I have made experiments in that way, and I have the pleasure to communicate the results to our society. Equal weights of zinc shavings have been kept in contact with equal volumes of gold cyanide solutions. In some cases zinc shavings were used in the ordinary way, in other cases they had been more or less coated with a very thin film of copper; the solution generally used, as giving the best results, being an ammonia-cupric solution, cheaper and more effective than tartrate or other organic solutions. The modus operandi to be subsequently described. The zinc coated with copper I call "zinc-copper couple." The zinc is to be only partially coated. Each series of the same sort of experiments being made, for the second lot of experiments, at the temperature of the laboratory, 19 to 22 C. (65 to 70 F.) and also at a temperature of 80 to 85 C. (175 to 185 F.) the conditions being always the same for the zinc and the zinc-copper couple. After my first visit to the Rand, where I had seen with the greatest interest those questions of cyanide process and the two different systems of precipitation, I had decided to make some experiments, on my return to my laboratory, from theoretical views my visit had suggested to me. But, being very busy with researches of another sort and my laboratory not being fitted with the requisite for assaying, I have only been able to make some preliminary experiments, and I had to abandon such researches till I came back to the Rand. I will relate briefly the result of the preliminary experiments on the comparative action of zinc and zinc-copper couple. First, I made from one gramme of zinc shavings three small balls, not too hardly pressed. No. 1 was left as it was; Nos. 2 and 3 have been slightly coated with copper; No. 3 more than No. 2. Three 100 c.c. gas-measuring tubes have been filled with water very slightly alkaline by soda and inverted on the same glass jar containing water; balls 1, 2 and 3 being placed in the lower part of each tube. The apparatus has been left for fifteen days, and then the quantity of hydrogen liberated in each tube has been measured, the quantities being: No. 1, nearly ½ c.c.; No. 2, 26 c.c.; No. 3, 24 c.c. The second experiment has been made with some balls, placed in the same quantity of gold cyanide solution —KCy per cent O, II. After three days, the quantity of gold precipitated has been: For No. 1, 5 milligrammes; for No. 2, 7 milligrammes; for No. 3, 7 milligrammes; corresponding to, taking 100 for zinc only, 140 for coated zinc, or 40 per cent more gold precipitated. The third experiment gave: No. 1, 18 milligrammes; Nos. 2 and 3, each the same weight, 28 milligrammes, or 55 per cent more gold precipitated. Being satisfied to see I was in the right way, and precipitation was largely increased by using zinc-copper couple, I had to abandon provisionally such experiments. On the beginning of this year, I paid a short visit to Johannesburg, and, thanks to my friend, Mr. H. Stephan, manager of the Wemmer, who had been formerly in the same laboratory as myself, a small experiment has been made on ordinary cyanide solutions. Experiments previously made in my laboratory, being on solutions made from pure gold and pure potassium cyanide. Although the zinc-copper couple had been prepared some months ago, and was far from being clean, the results have been satisfactory, as proved by the following figures:

Gold in original solution.....0.8.8. —equal to 100
After contact with zinc only.....0.4.0. —equal to 48
After contact with zinc-couple.....0.2.16.—equal to 32

52 per cent from total gold precipitated by zinc, and 68 per cent by zinc-copper couple, showing an increase of 30, 8 per cent.

We come now to experiments with cold and hot solutions. This new series of experiments has been made in E. B. laboratory. In those experiments, the time for cold treatment has been 24 hours, and only 18 hours for the last one; for hot treatment only two hours. If the duration of cold treatment had been only two hours, so as to be approximately on the same conditions as in usual practice, some one could have objected against zinc-copper couple that its action is more effective on the beginning, but that after two or more hours the efficacy of action of zinc-copper couple is partly destroyed and gradually diminishing when zinc is partly coated with gold. Such objection is answered beforehand, the length of experiment being 24 hours for cold treatment. Experiment A.—Four equal lots of zinc shavings, 25 grammes each, are put in glass flasks. Nos. 2 and 4 are prepared as zinc-copper couple. One litre of gold solution is poured in each flask. This solution is prepared from cyanuration of a mixed lot of all sorts of samples received for analysis, containing base metals. Nos. 1 and 2, cold treatment, 24 hours. Nos. 3 and 4, flasks kepts two hours in water-bath; temperature kept at 80 C. (175 F.) If we take 100 for gold precipitated by zinc, we have for zinc-copper couple 161, 7, cold treatment, 24 hours; showing a large increase in favor of zinc-copper couple. If we take 100 for the quantity of gold precipitated from cold solutions in 24 hours, we have for the quantity of gold precipitated by hot treatment in two hours, respectively: For zinc, only 109, 52; and for zinc-copper couple, 157, 14. We can say: Fresh zinc precipitates as much gold by hot treatment in two hours, as by cold treatment in 24 hours; we are to see from other experiments that this proportion is less when zinc is not fresh, but for zinc-copper couple it is much more regular, and nearly the same for 24 hours' cold treatment and two hours' hot treatment.

EXPERIMENT A.

	Milligrammes Gold Per Litre After Treatment.	Milligrammes Gold Precipitated Per Litre.	Gold Per Ton in Solution After Treatment.	Gold Precipitated From 100 in Original Solution.
			dwts. grs.	
1. Zinc	4.70	7.35	2 17 3-4	61 00
2. Zinc and copper.	0 16	11.89	0 2	98.67
3. Zinc	4.00	8.05	2 8	66.80
4. Zinc and copper.	0.50	11.55	0 7	95.85

1 and 2 cold treatment (24 hours). 3 and 4 hot treatment (2 hours).
Original solution—Gold per litre, 12.05 milligrammes.
Gold per ton, 7 dwts 0 grs.
" KCy per cent 0.017. KCy: G=14.27 (cyanide and gold quotient).

EXPERIMENT B.

			dwts. grs.	
1. Zinc	0.48	2.44	0 6 7-10	83.56
2. Zinc and copper.	0.38	2.54	0 5 1-4	86.30
3. Zinc	0.96	1.96	0 13 1-2	67.12
4. Zinc and copper.	0.46	2.46	0 6 4-10	84.24

1 and 2 cold treatment (24 hours). 3 and 4 hot treatment (2 hours).
Original solution—Gold per litre, 2.92 milligrammes.
Gold per ton, 1 dwt 16 9-10 grs.
" KCy per cent 0.06. KCy: G=205.48 (cyanide and gold quotient).

EXPERIMENT C.

			dwts. grs.	
1. Zinc	0.62	8.58	0 8 6-10	93.26
2. Zinc and copper.	0.26	8 94	0 3 6-10	97.17
3. Zinc	1.78	7.42	1 0 9-10	80.65
4. Zinc and copper.	0.26	8.94	0 3 6-10	97.17
5. Zinc	0.26	8.94	0 3 6-10	97.17
6. Zinc and copper.	0.26	8.94	0 3 6-10	97.17
7. Zinc	0.70	8.50	0 9 8-10	92.40
8. Zinc and copper.	0.36	8.84	0 5	96.08

1, 2, 5 and 6 cold treatment. 3, 4, 7 and 8 hot treatment.
Original solution—Gold per litre, 9.20 milligrammes.
Gold per ton, 5 dwts 8 8-10 grs.
" KCy per cent 0.019. KCy: G=20.65 (cyanide and gold quotient).

EXPERIMENT D.

			dwts. grs.	
1. Zinc	0.92	8.36	0 12 8-10	90.09
2. Zinc and copper.	0.40	8.88	0 5 1-2	95.69
3. Zinc	0.88	8.40	0 12 3-10	90.51
4. Zinc and copper.	0.88	8.60	0 9 6-10	92.67
5. Zinc	0.28	9.00	0 3 8-10	96.98
6. Zinc and copper.	0.20	9.08	0 2 8-10	97.84
8. Zinc and copper.	0.32	8.96	0 4 4-10	96.55

1, 2, 5 and 6 cold treatment. 3, 4 and 8 hot treatment. Assay No. 7 lost.
Original solution—Gold per litre, 9.28 milligrammes.
Gold per ton, 5 dwts 9 6-10 grs.
" KCy per cent 0.019. KCy: G=20.47 (cyanide and gold quotient).

EXPERIMENT E.

			dwts. grs.	
1. Zinc	0.47	3.42	0 6 1-2	87.92
2. Zinc and copper.	0.09	3.80	0 1 1-4	97.68
3. Zinc	0.31	3.58	0 4 1-3	92.51
4. Zinc and copper.	0.07	3.82	0 1	98.71

Original solution—Gold per litre, 3.89 milligrammes.
Gold per ton, 2 dwts 6 4-10 grs.
" KCy per cent 0.018. KCy: G=46.27 (cyanide and gold quotient).

N. B.—All those four experiments have been made by cold treatment. The hot experiments have not been noted, on account of some errors in subsequent analysis, due to uncertainty in corresponding marks of flasks and crucibles.

EXPERIMENT F.

			dwts. grs.	
1. Zinc	0.22	3.08	0 3	93.33
2. Zinc and copper.	0.04	3.26	0 0 6-10	98.78
3. Zinc	0.12	3.18	0 1 6-10	96.36
4. Zinc and copper.	0.06	3.24	0 0 8-10	98.18
5. Zinc	0.20	3.10	0 2 8-10	93.94
6. Zinc and copper.	0.08	3.22	0 1 1-10	97.60
7. Zinc	0.08	3.22	0 1 1-10	97.60
8. Zinc and copper.	0.04	3.26	0 0 6-10	98.78

1, 2, 5 and 6 cold treatment. 3, 4, 7 and 8 hot treatment.
Original solution—Gold per litre, 3.30 milligrammes.
Gold per ton, 1 dwt 22 1-10 grs.
" KCy per cent 0.013. KCy: G=39.4 (cyanide and gold quotient).

It is well known that the ratio of free KCy (potassium cyanide) to gold in solution, which I call cyanide-gold quotient, is a great factor in the precipitation of gold. In the experiment A, made with a rich gold solution, 7.0 dwts per ton and KCy 0.017 per cent, the quotient is 14.27. The experiment B has been made in very different condition. Gold per ton only 1 dwt 16 9-10 grs, but KCy 0.06 per cent, making the quotient 205.48, or nearly fifteen times greater than in experiment A. In such conditions, we see that with a very high cyanide-gold quotient the difference of action of zinc and zinc-copper couple for cold treatment has been only 100 to 104.1, or 4 per cent in favor of zinc-copper couple; but for hot treatment the difference is much greater. If we take 100 for gold precipitated by zinc in two hours' hot treatment, we have 125 for gold precipitated by zinc-copper couple. Other experiments, C, D, E, F, have been made in nearly the same conditions as previous experiments. In C, the zinc-copper couple have been retreated by ammonia-cupric solution; and for experiment E, I have added to each flask 25 grammes zinc, the Nos. 2, 4, 6 and 8 being treated by ammonia-copper solution. Experiment F made with same shavings as precedent experiment. The results of all experiments are in favor of the action of zinc-copper couple and hot treatment, and show that hot treatment precipitates as much gold in two hours as cold treatment in 24 hours, and practically 24 hours cold treatment is an impossibility.

The chairman was sure they had all listened with great interest to Mr. Ehrmann's paper. He might mention a zinc-copper couple was brought forward by a friend of his in London—Mr. Gladstone. He used it for many experiments in decomposing various solutions.

Mr. Butters: Did Mr. Ehrmann analyze his zinc? Was it pure zinc or ordinary commercial zinc?

Mr. Ehrmann: It was zinc I got in Johannesburg, because I know the action of pure zinc is very slight. Pure zinc is nearly free from being attacked, but when it contains some quantity of impurities the action of acids and alkalies is largely increased. I would not make experiments with pure zinc, because I wish to make experiments from a practical point of view.

Mr. Butters: Do I understand that in your paper you advise hot treatment?

Mr. Ehrmann: I think hot treatment gives quicker results.

Mr. Butters: Where there are 1000 tons of liquor handled in a day we cannot afford to raise the temperature.

Mr. Ehrmann: Why not?

Mr. Butters: It would be too expensive to raise the temperature of 1000 tons of liquor per day. The average temperature here would be somewhere in the neighborhood of 60 degrees. What temperature do you advise?

Mr. Ehrmann: 175 Fahrenheit.

Mr. Butters: So you would raise the temperature about 115 degrees Fahrenheit?

Mr. Ehrmann: About 60 some odd degrees C.

Mr. Butters: That would be absolutely impracticable, because, taking in all the cyanide works, we use 3000 or 4000 tons of solution per day.

Mr. Ehrmann: I made these experiments first to know what was the action of hot treatment. There are cases I know where 2 dwts of gold are left in the tailings.

Mr. Butters: In our ordinary zinc process the average amount is only 4, 5, or 6 grains. There are two questions I would like to ask. You are speaking of this as a practical thing; it would be absolutely impracticable to use hot solution. What greater efficiency would zinc-copper couple have over zinc itself if zinc-copper couple had been in use two or three weeks, because we do not clear out only once a month.

Mr. Ehrmann: I have not finished my experiments.

The Chairman: Do you notice any difference here in precipitation in the hottest summer months and the coldest months?

Mr. Butters: I have not noticed any experiments. I can answer the question by looking at our ledger, because we have kept very careful results.

The Chairman: Two or three years ago I made some experiments also in this way, but I did not arrive at any satisfactory result. There is another thing with regard to the heating question. If we heat the solution, what would be the effect generally? That is a question I will not answer. (Laughter.) The other question is: If you have got to heat 1000 tons of water to a certain number of degrees, find out how much coal you have to use to raise that water so many degrees. It might be more economical, instead of raising the temperature of 1000 tons of water 60 degrees, to generate electricity by using the coal. That is a very simple question.

Mr. Butters: It is a very simple question, but all these things are extremely interesting and well worth studying. I hope Mr. Ehrmann does not think that we depreciate the value of his paper because we ask questions.

Mr. Ehrmann: No, certainly not. I prefer to communicate the result of my experiments, so that they can be discussed.

The Chairman: If you get the solution going through two bottles, keeping it going through say for three or four weeks, the comparative result would be interesting.

Mr. Ehrmann: The difficulty is to have the same quantity of liquid flowing through two bottles. I was for some time making some such experiments, but I could not regulate the flow.

The Chairman: Yes, there is a difficulty in that.

Mr. Ehrmann: I would like some experiments to be made.

The Chairman said they would be very glad to hear Mr. Darling's opinion.

Mr. Darling: I am afraid I cannot give you any

* Trans. Chem. and Met. Soc., Johannesburg.

more information. I should prefer to read the printed report first.

The Chairman: Have you noticed any difference between summer and winter precipitation?

Mr. Darling: No, I can't say that I have.

Mr. Butters: In the United States they make a strong point of temperature. Dr. Loevy corrects me; it is more particularly with regard to extraction.

Mr. Ehrman said he had the same extraction in 2 hours 40 minutes in a hot solution as he had in 24 hours in a cold solution.

Dr. Loevy: About a year ago I made a series of experiments with regard to extraction from different temperatures. The difference was indeed a large one. I remember certain experiments which were made with slimes for the May Consolidated. The difference in the extraction was a very low one—only 52 per cent, but in the solution it went up to 72 per cent.

Mr. Ehrmann: One ton of coal will raise the temperature of about sixty tons of solution to 90 degrees.

The Chairman: Is that theoretically or practically?

Mr. Ehrmann: Practically.

The Chairman: It would be a good heating effect.

Mr. Ehrmann: We have not to get steam from water. If we have to turn water into steam we have to use a large quantity of coal, but we have only to heat the water. I can give figures at next meeting if you like.

Mr. Butters: If you please. I think there may be something in heating the solution. For instance, you might get a little higher extraction.

Some Artesian Wells.

The sinking of artesian wells in the more arid parts of California is yet in its infancy, notwithstanding the many thousands of acres that have already been redeemed from a desert condition. There is need for some work on the part of the State or counties to determine what are the probabilities of striking water in many places. State Mineralogist Cooper will doubtless include in his investigation of the water supply of the State this source. In many of the districts in the southern part of the State, which were of barren and desert appearance a few years ago, and are now fruitful, the wells are flowing, while in many others pumping must be resorted to. In the latter case small gasoline engines or windmills are generally used. However, the Bakersfield Electric Power Transmission Company, when organized, looked upon the furnishing of power to the owners of wells in Kern county as one of the best sources of income. In the northern and central parts of San Joaquin valley, in this county, are numerous flowing wells in certain townships, the better ones flowing from 1,000,000 to 2,000,000 gallons daily. The wells are from 225 to 800 feet deep. On this page is illustrated a well on the property of the Miramonte colony.

The second illustration is of a well in Fresno county at the residence of G. Heminghaus, near Mendota. It is 8 inches in diameter, 740 feet deep and flows 500,000 gallons daily.



MIRAMONTE COLONY'S ARTESIAN WELL, KERN COUNTY.



HEMINGHAUS' ARTESIAN WELL, FRESNO COUNTY.

From Mine to Mint.

NUMBER IV.

By D. K. TUTTLE, Ph. D., Melter and Refiner of the United States Mint at Philadelphia.

Fine Bars.—The bullion thus purified is now ready for issue to the public for industrial use, or to enter on its second stage toward coinage.

The consumption of gold and silver in the industrial arts is much greater than is generally supposed.

During the year ending June 30, 1895, gold and silver bars for industrial use were manufactured in the Philadelphia mint and the assay office at New York to the coinage value of $17,818,581, in about equal proportions as to value. Private refineries furnished not less than $5,000,000 more. This first cost for what to the gold beater, jeweler, watch case maker, etc., is simply raw material represents an enormous industry when we consider the amount of high-grade labor which is bestowed on gold and silver wares. These bars are 0.999 fine and are furnished to the public by what may be called a system of exchange.

A depositor may bring crude bullion in any quantity ($100 or more in value) and receive either fine gold bars or coin, at his option, to the full value of the gold in his deposit, less a trifling charge for melting, assaying, parting, etc. These charges vary according to the nature of the deposit, but may amount to 5 cents per ounce. The bars or coin are delivered from stock on hand as soon as the value of the deposit is ascertained by assay, usually the following day. For the silver contained in gold deposit the owner may either receive pure silver or be paid in silver dollars or currency, at the market value of silver.

Ingots for Coinage.—Having a stock of refined gold and silver nearly pure, the first step toward conversion into coin is to make an alloy with copper, in such proportions as will produce standard planchets or "blanks" in the hands of the coiner. While the standard fineness of gold and silver coin is the same, yet, as will appear later, the quantity of copper to be used in the two cases differs a little, yet materially.

Weighed quantities of gold and copper, or of silver and copper, are melted together in a large black-lead crucible, the molten metals thoroughly mixed and then poured into cast-iron moulds to produce what are known as ingots. These are rectangular bars, differing in size according to the kind of coin for which they are intended. The ingot for silver dollar coinage is $1\frac{5}{8}$ inches wide by $\frac{1}{2}$ inch thick and $12\frac{1}{2}$ inches long. Some seventy such ingot bars are made from one "melt," and weigh collectively about 3300 ounces (220 pounds).

All the ingots are stamped with the melt number, of which a record is kept by the melter and refiner, by the assayer, and by the superintendent.

The crucible is set for the day's work in a furnace peculiarly adapted to the purpose, and a continuous fire maintained, using the best stone coal and a natural draft. Five or six melts are made in each furnace during the eight hours; and if the crucibles were taken out of the furnace at each time of pouring much time would be lost in resetting and surrounding it with a fresh fire.

The metal, when melted, is thoroughly mixed by stirring with a tool not unlike a churn dasher, and it is then ladled out into the molds with what is called a "dipping cup." This is a small black-lead pot made with a lip on one side and a straight edge on the opposite side, so formed as not to be crushed when firmly gripped by a pair of nipping tongs.

The molten metal is slowly poured from the dipping cup into upright molds, of which some twenty are placed in a shallow iron pan convenient to the furnace. As soon as a mold is filled it is removed by an attendant helper, and passed by him to another, who opens it on an iron-covered table and throws out the red-hot ingots. These are chilled in water and then immersed for a few minutes in very dilute sulphuric acid. This latter removes a slight coating of copper oxide and gives the ingot a bright matte color. The "gate" end of the ingot is then cut off in a "topping machine," which has a shear knife driven by steam power. The little fringe left on the ingot by the parting line of the mold is removed by a file, and then each ingot receives the number indicating the melt from which it was made.

The mold, when ready for use, consists of three pieces, clamped together by a band and set screw.

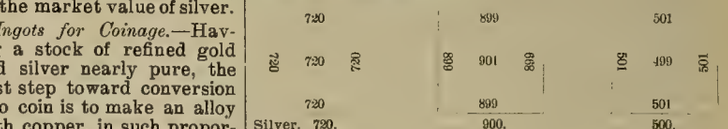
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Standard coin is composed of 900 parts of gold (or silver) and 100 parts of purest copper in each 1000. While the law allows a slight margin in the fineness of our coins, to provide for the limitations of all human workmanship, yet this margin is sharply defined, and is but a fraction of 1 per cent. Small as this margin is, no mint work would be considered good which did not produce coin very far within its limits. Our gold coin rarely varies from standard fineness by more than three one-hundredths of 1 per cent. Silver coin, which is much more difficult to make uniform, as will be explained, may vary by as much as one-tenth of 1 per cent in individual pieces, though the average is almost exactly correct.

It may seem to be a rather simple problem to first calculate the quantity of copper required to be added to bullion of known fineness and then to so apportion the metals on an accurate balance as to get an almost mathematical result after blending them by fusion.

If this were so, the formula for the production of gold and silver ingots would be identical.

In fact, the practice is very different in alloying the two metals for the production of standard coin. If gold and copper are melted together in any proportion and thoroughly mixed while fluid, the resulting bar or ingot will be uniform throughout in composition. But when silver is alloyed with copper only one proportion is known which will give a uniform casting. This proportion is 72 per cent silver to 28 of copper, and differs widely enough from our standard alloy to complicate matters in a marked degree. With more silver than 72 per cent the center of a cast bar will be richer than the outside, which chills first, while with a less percentage than 72 per cent the center of the bar will be poorer and the outside richer than the average. This characteristic of silver-copper alloys is known to metallurgists as "segregation."



Section through silver-copper bars, showing effect of "segregation."

It would seem that any alloy of silver and copper containing either more or less silver than 72 per cent has a lower melting point or remains fluid longer than the 72 per cent alloy. Hence the last portion of metal to chill in the center of a bar will in the one case be richer and in the other poorer than the average fineness of the molten metal poured into the mold when cold. A cutting from the outside of such a bar is, therefore, never taken for an assay. Only when the bar approaches fine silver can "a cutting" be relied on by the assayer. When ingots are made for standard silver coin samples are taken from each melt by the assayer, whose certificate is necessary before the ingots can pass to the coiner. Since a cutting from single ingots, or even a sample bar cast from the melt, would be misleading, what is called a "granulation" is taken. When a "melt" is ready for pouring into the molds, a little of the molten metal is dropped into water, giving "grains" or large shot, which may be rolled out and used entire, or nearly so, for assay. Two such granulations are, in fact, taken, one at the commencement of the "pouring" and a second when the crucible is nearly empty. These granulations are each assayed, and must not only show the melt to be of proper fineness, but must agree with each other within some hundredths of 1 per cent before the ingots made from the melt are adjudged to be of proper fineness to pass the coiner.

(*To be Continued.*)

Mining Summary.

CALIFORNIA.

Amador.

Ledger: At the Monte Cristo the new mill with a capacity of 60 tons a day is nearly completed. The extent of the porphyry deposit is so far unknown, but the tunnel which taps it about 400 feet in the hill and runs into it 200 feet, where it is known to be 44 feet wide and the hanging wall is not yet encountered. The tunnel taps the ore body about 600 feet below the apex, through which a shaft has been sunk. At the bottom of the shaft the deposit is known to be 70 feet thick.

The new hoist is at work on the South Eureka new shaft, which is now down about 90 feet.

The people who have had an option on the Doyle mine have arranged to resume operations. They have interested new parties in the enterprise of which Doe, Bogard, Foye and Oliver are the principals. They intend to start work by continuing to sink the shaft.

At the Argonaut the Union Iron Works has the contract for the iron work of the Argonaut mill. Workmen are preparing the foundation for the mill opening up the tunnel to the shaft, which will connect with the ore bin, and through which the ore will be conveyed to the mill. The mill is to be forty stamps, with concentrator floor room for sixteen 4-foot concentrators.

The new hoisting works at the north shaft of the Kennedy is being built.

Butte.

Register: At Enterprise work on the mill at the Crystal Peak mines will soon be completed.

J. O. Carlisle is putting up two hydraulic derricks at his mine and has seventeen men at work.

B. P. Crandall and son are getting out timbers for putting their Winter mine in shape for hydraulic work.

At Hurleton, Wm. Butterfield is pushing work as fast as possible on the Phœnix and has eight men on the mine. They are now running a crosscut from the lower level, but will probably go to sinking again soon.

The new arrastra which was lately finished at the Pactolian mine was recently destroyed by fire.

Calaveras.

Chronicle: A portion of the old works at the El Encino mine were tapped a few days ago. The workmen in the new tunnel broke through into old excavations and a large volume of water soon worked its way out of the drain tunnel. The old works are badly caved and it will take some time to get the water out. A pump will be put in to remove the water in the new works below the drain level.

A large vein of rich ore was struck in the Lamphear last week on the 220-foot level. The vein at present is 5 feet wide and increases as work progresses, and the walls are 14 feet apart. The rock carries free gold and sulphurets. The mill has been started up.

Prospect: Several mines bonded by Mr. Willard in the Collier mining district, operations on which were temporarily suspended pending a report on the different properties by an expert from Boston, have resumed work under the supervision of John Heard.

DeLay & Harris of the May Day have commenced a tunnel on the Murphys grade, west of town, which will tap the May Day at a depth of over 600 feet.

The duration of the monitor's work in the Central Hill mine is nearing the end of the run for the season. Great progress has been made since they started up five months ago.

El Dorado.

Republican: The Grand Victory mine has placed its new pump in position and started to lower the water which flooded the mine some time ago. The last of the water was pumped out during the week, and now operations will be resumed.

Mr. Ish of San Francisco is preparing to work his mining claim in the south fork of the Cosumnes.

Inyo.

T. B. Phebey of San Francisco has bonded several prospects in the Panamint district and has ordered windlasses and lumber for three shafts, and twelve men are at work sinking three separate shafts to a depth of 100 feet.

Kern.

At Randsburg Baker and Ferris have purchased the Philadelphia, a short wedge-shaped claim adjoining the Butte, for $2000 cash. They have also bought the Whippoorwill claim.

Randsburg *Miner*: Fifteen men will be put to work next week on the Rand Mountain Mining Company's claims.

In the Wedge the shaft has reached a depth of about 350 feet, and in a drift being run off a new and rich pay streak has been struck. The work of sinking the shaft to the 415 foot level will again be taken up and pushed to completion.

In the Val Verde in the No. 2 shaft, which has heretofore been known as a low grade proposition, the ore running only about $8 per ton suddenly changed front this week and is now producing ore of higher grade.

Mariposa.

Gazette: The Selleck Gold Mining Co. at Haywards expect to have the hoisting works completed in about twenty days. The machinery for the mill is partly on the ground at present. The shaft on the mine is down about 200 feet and the rock taken from the vein is ribbon rock, which shows free gold and sulphurets. They have a large amount of ore on the dump and as soon as the hoisting works are completed sinking will be pushed ahead rapidly.

The Chileno Pete mine, near New Years, which is owned by Mr. Woodside, is about to be reopened. A company has been organized and operations will be commenced in a few days.

Nevada.

Union: In the German Bar mine owned by Buck Bros. of Moore's Flat in about three weeks time over $1000 was taken out with a hand mortar and the ledge keeps getting richer as depth is attained.

The 20-stamp mill at the Mountaineer mine has been started and will be kept running night and day. Superintendent Dennis has been doing considerable development work at the mine and the prospects are encouraging.

In the Providence mine in running a crosscut south from the 1700-foot level, a 5-foot ledge of the finest kind of milling ore was discovered last week. A few weeks ago the Providence laid off about forty-five men on account of the mine looking poorly, but they will now undoubtedly soon resume work.

Placer.

Sentinel: At La Trinidad mine, in Sailor canyon, the average width of the ore body is 20 feet, and the developments consist of five tunnels aggregating in length 1500 feet, from which crosscuts and prospecting drifts have been run to open up a body of ore ready for stoping, which justifies the company to erect a mill and reduction works. The mill will be run by water power, conducted by a pipe line of 4000 feet in length. The grading for the mill site will be finished this week. Material for building the mill is on the ground.

The Jupiter Consolidated and Winchester Gravel Mining Company, near Iowa Hill, are preparing to commence active development work on their property. The holdings of this company comprise about two miles of channel.

At the Mayflower mine the company is prospecting a new channel in the McCall pit and preparing to hydraulic next fall.

The big Eureka tunnel is now in 2090 feet. The rock is wet. An upraise will be commenced immediately.

San Diego.

In the suit of Golden Cross Mining and Milling Co. vs. J. Spiers et al., a stipulation has been filed in the Los Angeles court wherein it is agreed that the matter in dispute remain in statu quo for 105 days. If by the expiration of that time the company has not paid the indebtedness due the defendants, judgment may be entered in their favor. In such case the property will be held in trust for all concerned. The claims aggregate nearly $200,000.

Shasta.

Free Press: At Old Diggings men at the Evening Star mine are sinking the shaft and setting up a gasoline hoist.

Men are running a 1000-foot crosscut tunnel in the old Spanish mine. They will tap the ledge at a depth of 250 feet. The Hallidie wire ropeway is well under way. Fourteen of the twenty-five stations are already completed, and are from 12 to 50 feet in height. Thirty thousand feet of lumber will be used in their construction.

Murdoch, Thellar and Taylor of San Francisco have sold to C. O. Rose of Hornellsville, New York, for $15,000, the Sibyl quartz mine, above the Niagara mine; also the Monterey and Louisa quartz locations.

Sierra.

(Special Correspondence).—The Northern Belle Mining Co., owned by John Rosenfeld's sons of San Francisco, 2½ miles west of town, is operating five stamps. The company is prospecting through two tunnels. One is 400 feet along the line of the ledge, and a lateral tunnel is 775 feet. The ledge is 3 feet and the ore a fair grade. The sulphurets average one per cent and run $150 per ton. W. E. Murray is superintendent.

The Marguerite Gravel and Quartz Mining Co. of San Francisco, operating in Sierra and Nevada counties, have opened a tunnel on the ledge adjacent to their gravel property. The footwall is slate. The ore body is 45 feet wide and runs from $4 to $6 per ton. R. Phelan is superintendent.

The Tip Top and Bay Horse has a tunnel 50 feet following a 10-inch stringer leading to the ledge indicated by the croppings. This is an extension of the Butte Saddle mine, and is owned by P. Goff and others who offer favorable opportunities to capital.

The Cleveland mine, whose mill was recently destroyed by fire is erecting an 18-stamp mill. The tunnel is 2000 feet and taps a ledge of 30 feet whose footwall has not been reached. The formation is slate and porphyry. The ore averages $3.50 per ton.

A Milwaukee Co. has erected a cyanide plant on the Young America and is working the tailings at a net profit, it is stated, of $5 per ton. The America was closed four years ago, having worked the rich ore only out of the blanket lead. The low grade ore still remains.

The Bigelow, now known as the Sierra Buttes, is about to be reopened. This is the property of the progressive Martin brothers of Nevada City and some San Francisco merchants.

The Mountain mine, at one time a productive property, is in litigation.

The Wm. Tell mine comprises five claims. The footwall is porphyry and the hanging is a perfectly smooth slate. It has three tunnels. The upper is 150 feet, following the croppings, and the ledge is 2½ feet. The lower tunnel is 350 feet, tapping the ledge at 200 feet where it is 5 feet in width. The lower tunnel is 350 feet, tapping the ledge at 200 feet where it is 5 feet in width. The lowest tunnel is 450 feet and has not reached the ledge. The average ore value is $10, exclusive of sulphurets. A tunnel probably 1500 feet would cut the ledge at from 800 to 1000 feet depth. There is good timber, and water right available all the year. The company has exhausted its capital and the property awaits outside help.

Sierra City, Cal., June 12, '97.

Enterprise: Dr. Jump has bonded his mine in Sailor ravine to Robinson and Fairfax, who are now in possession and are working the property.

N. Hanson has struck gravel in his mine after running a tunnel in 200 feet. His tunnel is about 50 feet below the old Star tunnel, which was run years ago and abandoned because too high, the tunnel running over the channel.

Siskiyou.

Reporter: At Happy Camp the Klamath Flume and Mining Company within six months expect to complete nineteen miles waterway, half 8-foot ditch, remainder 6x4-foot flume. The company have decided to bring water from the east fork of Indian creek to a point on the Klamath 700 feet above the river, covering 1500 acres of ground. A sawmill which will cut 35,000 feet lumber daily will be built.

The Siskiyou mine on the river is now paying very well. The banks are over 100 feet in height. It is a high back channel of the river with plenty of dump. A 4-foot flume takes the ground. A ditch from Clear creek affords plenty of water for two giants, a 4 and 6-inch nozzle. The ditch is fifteen miles long and 5 feet wide. This, at the mine, gives a pressure of 200 feet.

The Pennsylvania Placer Company's mine has been worked for three seasons and the owners, Gordon & Sons, are well satisfied. They have 157 acres of ground, high channel of the river. A No. 2 giant supplied with a pipe tapering from 15 to 11 inches gives a pressure of 180 feet upper, 260 feet lower channel. Two flumes 2 feet wide, forty and twenty boxes respectively, tap the mine. A 30-inch ditch three miles long furnishes water for four months each season.

The Western Placer is a large property. The banks average 100 feet. Two miles of ditch furnishes water for two No. 2 giants. Three strings of boxes tap the mine.

Humphrey & Quigley, owners of the Commodore mine, have struck what they consider the best rock yet found. The vein is 26 inches wide in the new tunnel at a distance of 374 feet. They have started their twin arrastras.

The owners of the Brown Bear near Sawyer's Bar have struck a 2½-foot ledge that prospects well.

Journal: A San Francisco company expect to put in a plant on Salmon river between the Salmon River Mining Company's property and Sawyer's Bar. They have control of a large area of land and expect to work it on an extensive scale.

News: At Sawyer's Bar Hegler Brothers are taking out quartz from their lower tunnel.

The mill at the Fagundes mine is running on high-grade ore.

Finley & Co. have surveyed ground to build a new ditch and flume from White's gulch to their property near Sawyer's Bar.

The Oregon Company are packing ore to the Jumbo mill at an expense of $9 per ton, for packing and milling.

Trinity.

Journal: At Willow Creek, on the lower Trinity, the Clover Flat Mining Company, formerly the Bussell Mining Company, have commenced work on their mine. A new ditch will be constructed and the mine fitted up. About thirty men will be put to work and the new ditch will be completed by the middle of next month.

On Canyon creek the Globe mines have not yet started up; they are repairing machinery.

At the Maple mine they have discovered their main lode, and are putting on a heavy force of miners.

The Chloride mine under the management of Mr. Dedrick is increasing its force and driving tunnels and stoping out ore.

NEVADA.

Reno *Gazette*: In Olinghouse canyon there are between 75 and 100 tons of ore on the various dumps. Many tunnels are being run and shafts sunk.

Gold Creek *News*: J. S. Loder has taken a bond on the Empire property, owned by Parks and French at $25,000 and will begin work at once.

Pioche *Record*: Additional men have been put to work in the De Lamar mine and the company's mill is running full blast.

Dayton *Times*: The cyanide plant at the Eureka millsite is nearly completed. Only two tanks will be operated at first, and they will run on material that is on the ground. When this material is worked up, other tanks will be constructed, when tailings from the old Chollar reservoir and other places will be worked.

Eureka *Sentinel*: In White Pine district the force of men at the Chainman mine has been materially increased and more will be put on as fast as the material with which to work arrives.

Salt Lake *Tribune*: At Tuscarora last week the hoisting plant on No. 4 shaft of the Dexter was destroyed by fire; but the management is assured that there is sufficient ore on the dump to keep the mill in operation, and that the new hoister on the new shaft will be running by Saturday night. The reports from the property continue very encouraging, the ore bodies are in excellent condition and the outlook is bright.

OREGON.

Rogue River *Courier*: Harmon & Green are tapping Galice creek with a 1½-mile ditch. A giant and pipe will be in position this fall ready for the run.

Harrington Bros. have been getting out some rich rock from the Exchequer mine on Williams creek.

Medford *Mail*: F. V. Medynski on his Forrest creek quartz claim has an 18-foot ledge, which he is working on. The quartz is not especially rich, but the vast amount of it makes the proposition a valuable one.

The development work at the Shorty-Hope, near Ashland, has been showing up better rock lately than ever.

A 5-foot ledge has been struck in the Braden mine, Jackson county, in the 50-foot tunnel recently run. The 5-stamp mill connected with the mine has started up.

R. T. Shannon of Ashland and G. Bowers of San Francisco have leased, with an option of purchasing, the Oregon quartz mine on Little Applegate.

The Prescott Placer Dredging Company, capital $250,000, will send the dredger Anaconda, now working on the Seattle tide flats, about July 1 to Rogue river to take out gold-bearing sand from the banks and bottom of the river at the rate of 4000 cubic yards per day. This sand is said to run from 15 cents to $1 in gold per cubic yard. Sand yielding 15 cents per yard can be worked at a profit.

WASHINGTON.

Spokesman-Review: At Piere's Lake the Little Giant is working eight men in the 80-foot shaft, and the crosscut at the 70-foot level is in 20 feet. It is reported that shipping ore has been encountered in every opening made.

James Crawford, superintendent of the Piere's Lake and Flat Creek Company's properties, has reached a depth of 40 feet on shaft No. 1 on the Evening claim. The work at this depth has penetrated a heavy vein of sulphides of iron, carrying copper in various forms.

The Scotia Company, which was the first to open development work on Toulou mountain, has its machinery plant in operation and is making rapid progress on the ledge, and is sinking from the end of the 200-foot tunnel. The company is now taking out some shipping ore.

BRITISH COLUMBIA.

(Special Correspondence).—A British company—the Lillooet, Fraser River & Cariboo Gold Fields, Limited—claims ownership of a mine which is the biggest producer in this Province. This is the Lanark of the Illiciliwait district of northern West Kootenay. Last month this mine treated 3200 tons of ore and produced 430 tons of concentrates valued at $35,000. These concentrates were all shipped to San Francisco for refining by the Selby Smelting and Lead Co. A great deal more will go to California before the people of Vancouver are wide enough awake to establish a smelter in the city.

There is much depression in mining at present throughout the Province. All shares have fallen and the boom spirit has fled; but many claim that the sudden and unexpected depression is a historical feature of every mining country and every mining country's boom, and that it simply punctuates the death of the speculative feature in mining in this Province and heralds legitimate, slow mining business. In the meantime throughout eastern Canada and the States a large number of investors in British Columbia mines are loaded up with trashy stocks, and for the present the stock market is dead.

Vancouver, June 12, '97.

Spokesman-Review: Pack trains and prospectors' outfits leave Slocan every day for the headwaters of Lemon and Springer creeks. Not less than 300 prospectors are now in the contiguous mountains, and some rich finds have been made already this spring, although there is still plenty of snow in the higher altitudes.

There are thirty-six men at work on the Skylark and Ranger, on Lemon creek, which, with the Chapleau, are under bond to the Hall Exploration Company, Limited.

The Howard Fraction, on Lemon creek, which is being worked by the British Canadian Gold Fields syndicate, has begun shipping some of its high-grade ore.

In the American Boy, near Sandon, they have made a strike of about a 4-foot lead in tunnel No 1, of which about 2 feet is solid ore. The company has started another tunnel about 125 feet below No. 1, which is in about 20 feet. They expect to run about 175 feet to get below the upper winze and then drift.

The Sunshine Mining Company of Lardeau, B. C., has been floated in London. The properties owned comprise the Silver Cup, Sunshine and the Towser claims in the Lardeau country. Preparations are being made to develop them on a large scale.

Last week the Boundary Mines Company of New York put twelve men on to do assessment work on five of its claims in Central camp.

The tunnel on the Boundary Creek M. & M. Co.'s D. A. claim is now in more than 100 feet. The face is becoming more mineralized as it advances and the country rock is straightening up, so it is thought the ledge is not far ahead.

The Great Western will in a few days ship a carload a week up to the end of July. The lower tunnel is now being driven about 3 feet a day. It is now in about 108 feet, and they expect to get into the ore chute in another 100 feet.

The Blackock, on Wild Horse creek, near Salmon river, in British Columbia, has been bonded by the Hall Exploration Company from A. J. and Alexander Audit, the consideration being $70,000, of which $3000 is cash, $35,000 to be paid Nov. 1 next, and $32,000 June 1, 1898. The property has a shaft 30 feet on the footwall and, it is said, shows assays from $60 to $87 and some galena.

The Gopher, Maid of Erin, Homestake and R. E. Lee claims, north of the Rossland camp, have been transferred to the Homestake Consolidated Mines Company of London, Eng., which has a capital stock of $750,000, the intention being, it is said, to have the company start off, after everything has been paid for, with $100,000 in the treasury, with which to develop the properties. The deal is of course subject to ratification by stockholders.

A foot vein of high-grade free milling ore has been struck on the Great Western, on Toad mountain.

Spokane *Chronicle*: In and about Ainsworth

fully 200 miners are now at work. This is a larger number than at any time in the history of the camp.

Considerable excitement is expected over the new discoveries in the glacier basin between Lakes Kootenay and Slocan.

The syndicate which is working the Little Donald and the Black Diamond have about sixty men at work. They have a new steam hoist working on the Black Diamond. On these properties shafts are being sunk and a good grade of ore is coming to the surface.

This same syndicate has recently purchased the Lady of the Lake and the Mammie, and is working them from a shaft on the latter.

On the Tariff, Manager Langford is down 250 feet and has run three levels. The shaft is in quite rich ore all the way. About twenty-five men are at work.

The Mile Point, purchased by the British Columbia Gold Fields Exploration Company, has a large double shaft in a fine body of ore, some of which is wire silver.

D. S. Carriel, owner of the Rand property, will immediately commence an 800-foot tunnel.

L. J. McAtee is working a large force on the Twin, and will soon start a 1000-foot tunnel to tap the ore at a deeper level.

UTAH.

Salt Lake *Tribune*: There are indications that work will commence on the Gold Dust mill in a short time. The condition of the property is improving and the ore bodies are now among the largest in the district for the amount of work done.

The new pumping plant on the Alaska is now in operation and sinking from the 150 foot level will begin to-day.

Capt. Hank Smith says that at Tintic the work is devoted more to the blocking out of ore than to extraction. This is true of all the big mines at Eureka and Mammoth. At the Centennial Eureka only sufficient ore is being hoisted to meet the requirements of the payroll, upon which there are now about seventy-five men. From the Eureka Hill about twenty-five tons a day are being raised and put through the mill, while at the Keystone operations are going forward with but one shift. The same policy prevails at the Bullion-Beck, where some good ore is reported to have been recently uncovered in virgin ground, but the breaking down of it will not be commenced until such time as conditions in the metal market have improved.

The tonnage at the Eureka Hill mill is now averaging about 225 daily.

Ore is being extracted from the Japan lode at Ophir, and a shipment will very likely be made in the next few days. A shipment of ore is also booked to come from the Buckhorn, which has already made several this season.

Tintic *Miner*: Shipments from the district for the week are as follows: From the Bullion-Beck, twenty carloads ore; Centennial Eureka, three; Eureka Hill mill, twelve carloads concentrates; Uncle Sam, six carloads ore; Mammoth Mine, six; Mammoth mill, seven carloads concentrates; Swansea, four carloads ore; South Swansea, three; North Star, three; Joe Bowers No. 2, one; Luzerne, one; Domingo, one.

The development of the Orient property in West Tintic is being pushed and considerable good shipping ore is being taken out.

Spriggs and Millikin are developing their Wonder group northeast of Eureka. Their tunnel is now in about 145 feet and they expect to tap the vein before the month is out.

Good progress is being made in the lower tunnel of the Humbug and they expect to tap the vein before the end of the month.

The work of straightening up the shaft of the Martha Washington is nearly completed and development work can be commenced next week. The shaft is down 150 feet and makes a good showing of ore.

A new strike is reported in the Buckeye in a short drift from the 400 level. Superintendent Green states that the ore streak is 18 inches wide and assays 190 ounces silver, 63 per cent lead and $10 in gold.

The Swansea is drifting on the 650 level and is reported to be looking well. Sinking from the 650 will soon be recommenced.

Mercur *Mercury*: Since the enlargement of the Geyser mill about 100 tons daily are treated at that plant. As the ores of the property can be treated more easily and cheaply at this mill than at the Marion, the latter, pioneer mill in this part of the district, was closed down.

Col. Wall recently put a force of men at work on the Victor, between the Gold Dust and the Geyser-Marion, and they have encountered several feet of cinnabar.

There are indications that the Golden Gate mill will soon be in course of construction. Surveyors have been at work on the proposed millsite during the week.

Bingham *Bulletin*: At the Winnamuck on account of water it will take about a fortnight to reach the 300, when sinking of the incline is to be resumed, Manager Watson's intention being to go down 100 to 120 feet further and explore the vein in a new level. Some experiments are being made on second-class ore, which may result in additions to the machinery of the mill and its starting up.

The carbonate ore from the Black Dog mine is being treated by jigs, is yielding good concentrates, and a not unlikely result will be that a considerable tonnage will be worked. The dump of the Black Dog contains accumulations of years, amounting to hundreds of tons of similar ore.

The Giant Chief is proving the big ore body lately encountered to be continuous and important. The working force has been increased to sixteen, and it is the intention to put the property in shape for extensive production as speedily as possible.

Silver City *Star*: The Buckeye this week records a new strike in the drift below the 400-foot level. The ore assays 195 ounces silver, 63 per cent lead and $10 gold. The body is about 18 inches wide, and a winze following the ore body is being sunk.

J. G. Midgley states that the shaft on the Fissure has reached a depth of 223 feet and sinking is still being continued.

The work of sinking the Luzerne is still progressing and the ore body holds out well. A shipment of about twelve tons was made from the property last week.

IDAHO.

Spokesman Review: Superintendent H. B. King, of the Hiyu mine, in the Florence district, will put two shifts of men to work on his property about the middle of the month. Extensive machinery will soon be put in.

Spokane *Chronicle*: At Wallace the Poorman and Tiger mine is now being worked on the 1100-foot level, and are in a 14-foot ore body, with 6 feet of clean shipping ore.

The Standard mine is entering a big body of ore in the lower tunnel, and the shipments for the last twenty-four months have given a return of $70,000 to $90,000 per month clear of expenses. They have abandoned the upper tunnels, which have been purchased and are being used by the Mammoth mine. The tunnels will be extended on through to the Mammoth ore bodies, and the ore will be carried to the Gem mill, which they have leased. This mine gives employment to from 150 to 200 men.

The Frisco mine has been increasing its capacity and making improvements, but is now getting in shape to resume with a full force. There will be 300 more men employed on Canyon creek during the next three months than there has been during the last three.

Inter-Mountain: The Badger Gold Mining Company has purchased a 10-stamp mill, with agreement that it be completed within thirty days and shipped to Elk City, Idaho. The company owns two claims, the Badger and Homestake, but all of the development work is done on the Badger. It is free milling ore. A shaft has been sunk on the Badger about 100 feet, and 200 feet of drifting has been done. The company expects soon to put in a hoisting engine and continue sinking the shaft for development. The ore body is 3 to 7 feet in width. S. Silverman will resume the management of the property.

Boise *Statesman*: At the Flint mine in Owyhee county they have been working a lot of ore obtained from the dumps, and the company is so well pleased that it will probably reopen the mine and resume operations on a large scale.

At the De La Mar with the new Pelatan-Clerici process the ore is being worked up to 84 per cent.

MONTANA.

Inter-Mountain: The Gold Mountain Mining Company in Basin has purchased a 20-stamp mill and will have it on the ground within ten days.

From present indications there will be an enormous amount of development work done on the big mines of Butte during the year of 1897. At many of the Boston and Montana properties, preparations are being made to sink several hundred feet for the purpose of opening up new ore reserves. Sinking is now in progress at several of the Anaconda properties and at the present time preparations are being made to develop the shaft of the Green Mountain from the 1400 to the 1600-foot level.

Butte *Miner*: The Butte and Boston people will, now that they have bonded the Anderson, at once put in additional machinery and more men and develop the mine. The shaft will be sunk down much deeper and some extensive crosscutting will be done.

Regular shipments of copper ore of a good quality continue from the Original mine to the reduction works on the ore cars of the street railway company. The ore cars now in operation have proved a pronounced success, no accidents having ever occurred.

At Twin Bridges men have been set to work grading for the smelter to be erected by the Montana Smelting and Mining Company, an organization comprising several business men of Butte. The plant will have a capacity of thirty tons per day.

The Clipper group of claims, located about two miles from Pony, is furnishing about forty tons of ore daily for the mill, which yields about $20 per ton on the plates, and some $75 concentrates.

On the Alex Scott, east of Butte, operations are about to be resumed. The shaft is down 300 feet and several small shipments of ore which worked over 60 per cent copper have been made.

The Parrot Copper Mining Company is keeping its smelter in operation with ore from the Parrot and Moscow mines. A lease was recently let on the Little Minch claim. At the company's smelter at Gaylord about 130 men are employed.

In Park canyon at the 300-level in the Receiver there is a 4-foot lead on which drifting is being done.

WYOMING.

The manager of the New York and Western Mining Company, operating in the mountains about 17 miles from Saratoga, reports the discovery of a rich vein of gold ore with a pay streak 4½ feet. The ore yields about two ounces to the ton. The owners will at once let contracts for several thousand feet of tunneling on the vein and will commence shipments of the ore immediately.

Encouraging reports are received from Horse Shoe park prospects near Wheatland, where Johnson and Hammon have been developing claims showing silver-bearing galena. A vein 2 feet thick is being worked and ore taken out for a trial shipment.

Salt Lake *Tribune*: John Dern states that the properties and prospects south of Rawlins at Grand Encampment, as the spot has been christened, promises a scene of much activity the present season. Miners and mining men from many mining States are gathering on the ground, which has shown itself capable of great values. The Doan has sent out already about ten cars of ore that netted the producers at least $100 per ton on the haul to Denver, the ore showing a high percentage in copper. At the Golden Eagle he found a well-defined vein showing as much as ten inches, carrying free gold in pronounced quantity. The Gold King group, owned by Nebraskans, is another that presents a most promising appearance, and with abundant water and plenty of timber.

COLORADO.

Republican: At Cripple Creek there is new mill talk, and two new ones will be built—one at Florence and another at Colorado City. Each of these will handle 100 tons a day, and will raise the capacity for Cripple Creek ores to 1250 tons daily, counting the mills up, those in course of erection and the enlargements under way for plants now in operation. This is more than double the present capacity, and allows for handling 37,500 tons of mill ore a month, or nearly 500,000 tons a year. It is looking ahead to an annual production of low-grades equal to at least $10,000,000, and, with the smelting grades, to a total output of more than double that amount.

Von Hemert & Anstie, since taking hold of the C. O. D., have shipped 140 tons of mill dirt that ranged from $10 to $20 a ton, and twenty tons of high-grade that ran from 6 to 18 ounces a ton. In the 455-foot level they have an 8-foot body of mill ore, from which they are producing steadily. They are using the Rebecca shaft and working fifteen men.

A crosscut is now being run to prospect the Plymouth Rock ground from the bottom of the 1000-foot shaft.

The Portland is now in a body of ore of great width and high values, such as the mine has not been getting for months, having been encountered in the 700-foot level from the Burns shaft. The mine yields from fifty-five to sixty tons a day.

At the Gold Coin the product is 200 tons a week, and no increase can be expected while the surface work is in progress. The vein has been drifted on for 60 feet at the 320-foot level and shows good ore continuous.

The enormous body that was opened 20 feet wide in the west drift from 600 feet depth in the Granite is yielding an average of twenty tons a day.

The El Paso Gold King shaft has reached a point where it is proposed to cut the 500-foot station.

Hoskins, Clark & Keith have refound the ore in the Virginia M. by drifting west from the winze sunk from the Anaconda tunnel level.

By the last of June the Portland should be into the Anna Lee and the Isabella into the Smuggler chute. The Victor should have the new high-grade bodies in shape for stoping, and the Union will also, in all probability, be striking higher again; but until then no heavy increase can be expected. If, as expected, the enlargement of the Metallic Extraction plant is completed, the Turner mill going and the page again in operation, some 6000 tons more of mill ore should find a market in July, and from that time on the mill capacity hold that increase until about October, when the El Paso at Florence and the enlargements at Colorado City should bring about another increase in the output of the low-grade.

R. Mackey of Nevadaville, associated with mining men of Denver, has taken a lease and bond on the Golden Treasure mine in Nevadaville. Sinking with three eight-hour shifts is progressing at a depth of 1000 feet, and in driving the lower levels a good body of ore has been opened up. The ore bins are now piled high with ore, and from this on steady shipments will be made to mills and smelter.

The Last Dollar, on Beacon, produced during the month of May fourteen carloads of high-grade and twenty-two of mill ore, the grades running about $60 for the first and half as much for the second.

The Young lease on the Arequa townsite sent out twelve tons of $50 ore during the week, and the Roberts lease will make a shipment of sixteen tons of about $40 grade.

At Leadville, in the Yak tunnel, built mainly for drainage and transportation two or three months ago, an ore chute was discovered on the west of the tunnel line, and since then the shipments average fifty tons per day of ore running about $11 to the ton. The extension of the tunnel will tap the Little Johnny mine at the depth of from 1100 to 1300 feet below the surface. The breast of the tunnel is now in nearly two miles, and a contract has been authorized for 4000 feet farther.

Leadville district is gradually pushing its limits, until now it may be reasonably claimed that the territory known to be mineralized extends from the northern side of Big Evans gulch to the Park side of Weston pass, a distance of fully ten miles.

In the Twin Lakes district the Mountain Quail has opened up a vein of ore from 4 to 6 feet wide, with a pay streak of from 4 to 16 inches.

A large force of men is at work blocking out ore on the Gordon, and the property is being put in excellent shape pending negotiations for its sale.

Work will be started on the Mt. Elbert tunnel at an early day. A plant of machinery has been erected. The work will be done with air drills and the tunnel will be pushed in at least 5000 feet. It is already known that twenty veins cross the line of the bore of the tunnel, all of which will be cut at a great depth.

The Bwlgoch Company have been prosecuting underground development all winter, and will soon be ready to start its mill.

At Alma the Alma, Bucksin, Beaver, Tarryall and Lowe placers are now running with full force and the strongest head of water that has been supplied for years.

At Durango, at the Small Hopes mine, the company intends to enlarge the mill and to add the necessary machinery and appliances for recovering the silver values, and this will probably be done this year. The Small Hopes mine will soon have a large quantity of ore blocked out.

At the Columbus mine since last December from twenty-five to thirty men have been employed, and drifting at the 60 and 100-foot levels has been urged.

Near Central City the Next President Mining Company are operating their mine, and have let contracts for several hundred feet of sinking and crosscutting. The shaft is at present down 280 feet. The company intend to sink 900 feet.

The new machinery has been installed on the Randolph mine, in Russell gulch, and the new shaft is completed. Sinking will be commenced in a few days, the operators intending to sink at least 200 feet deeper.

The finishing touches are being put to the Pederson shaft house on Bobtail hill. The machinery is in place and sinking will be commenced.

The new shaft house is well under way at the Clifton Belle mine, on Pawabic mountain, and the new machinery is expected in a few days.

Kuengel brothers, who are managing the Galena mine for the Alpha Gold Mining Company, in extending the 500 west level, have struck a 4-foot body of ore.

ARIZONA.

Republican: The placer ground owned by the Lynx Creek Gold Mining Company covers ten square miles. It is an English company, which has been operating for the past five years. Their land lies in the basin traversed by Lynx creek and runs upon the slope of the hills on either side. The gravel runs to a depth of from 10 to 25 feet. The richest dirt is that lying 1 foot from bedrock. Some of this runs as high as 30 cents a cubic yard. The average value is 25 cents a cubic yard. It is more or less valuable from the grass roots, and colors are found all over their holdings. The ground contains but few large boulders, and is worked easily. The steam shovel handles about 400 cubic yards a day. The gravel is carried around to an incline bin, where it is washed down into a revolving washer, which throws the rocks into a carrier and drops the washed material into a basin below. From this basin it is pumped into the amalgamator, where the gold is caught by the plates and in the pockets at the end of each inclined plate. The water is carried out to a reservoir, from which it runs around through a series of settling basins into a large reservoir. From here it is pumped back and used over again.

Tucson *Citizen*: The Empire smelter at Crittenden has been running for seven days with much success, running eighty tons through per day. The Old Flux and Hardshell mines are furnishing the ore. About one hundred tons are being delivered per day at the smelter. These are lead, silver and gold ores.

Williams *News*: A shipment of forty tons of copper ore was made from the Bill Nellis mine last week. The ore, which goes to Pueblo, is a magnificent oxide, the average assay for the entire shipment being 37½ per cent copper.

The Anita Consolidated Copper Company is pushing developments rapidly and opening up large bodies of rich ore on several of their claims. The company has perfected arrangements to ship ore immediately.

The Tusayan Development Company has begun running a tunnel on the Hogan mine. This is a big body of copper sulphuret ore in the walls of the canyon that can be traced for a perpendicular height of 400 feet, with a width of 600 feet. It assays 25 per cent copper.

Journal-Miner: There has been unusual activity in mining during the past week. Work has been commenced as follows: On the Summit and Model mines in Weaver district; on the Buckeye mine in Turkey Creek district; on the C. O. D. mine in Big Bug district, and the Emmet mine in Mineral Point district.

The Sun Dance stamp mill and concentrators are running steadily on ore from the company's mines. L. A. Davies, superintendent of the property, expects to have his rolls and jigs ready to start up in a short time.

Parties have taken a bond on the Tucker mine, near Congress, and have commenced active work in the development of the property.

W. G. Press, who has taken a bond on the Storm Cloud group of mines, in Maple gulch, owned by Fred Williams, has just let a contract for 350 feet of work to be done on the property. He also expects to let another contract for sinking a shaft 100 feet.

NEW MEXICO.

Cerrillos *Rustler*: The McGhee Gold Mining and Milling Company's machinery for the mill is already built and ready for shipment, but will be held in the East until the entire plant is finished. The machinery and power will have a capacity of about fifty tons of ore daily, though at present the vat capacity will be about twelve tons, but will be increased very shortly.

At Santa Fe the turquoise properties near Cerrillos, owned by the American Turquoise company, has been sold under a mortgage held by the Farmers' Loan and Trust Company of New York. The mines sold were the Old Castillian, Morning Star, Muniz, Gem and Sky Blue and were bid in by C. W. Waterman for the Trust Company for $75,350. The supposed object of the sale is to bring about a reorganization of the affairs of the Turquoise company. The original debt was something like $225,000 borrowed money, of which all but $87,000, principal and interest, had been repaid.

It looks as if the turquoise product next season would be considerably enlarged in the region north of Cerrillos. Michael O'Neil and his partners are doing a large amount of development work on their claim adjoining the old Castillian and the Persian claim.

Mechanical Progress.

The Use of Compressed Air for Mining Purposes.

NUMBER VI.

A lecture delivered to the Engineering Students of the Leland Stanford Jr. University, May 3, 1897, by EDWARD A. RIX, M. Am. Soc. M. E.

For a properly operated mine, having a considerable quantity of water to pump, a station pump, with compound engines, using reheated air, will give the greatest economy. When it comes to the subject of rock drilling, which forms as a general rule, two-thirds of the power required underground, at present compressed air has the field all to itself, and here utility alone is considered, for rock drills are as uneconomical in the use of air as a direct acting steam pump, still, they do such a tremendous amount of work in comparison to the cost for operating them, that their economy is measured only in the amount of rock or ore which they are instrumental in extracting, and not in the power which is required to drive them. It is evident, however, that it will take less power to furnish air for these machines, if such air is taken directly from the transmission main, than if it were furnished at the surface by water power or electrical or steam motor. Besides, a considerable portion of the cost of furnishing compressed air to these machines is offset by the pure air which is furnished to the miners underground and the readiness with which it blows the smoke caused by blasting from the various underground workings. For underground work it is also valuable in case of accident, and an air pipe leading back into a drift, a portion of which has caved and imprisoned miners beyond, has not only furnished them pure air but at the same time these pipes have given a means of communication with those outside.

The use of air around a mine is also in the nature of an insurance, especially where a mine has the apparatus for using steam. Air being used practically under similar conditions to steam can be utilized in the motors or engines and in case anything should happen to the pneumatic system, it will only take a few hours to close off the proper valves, fill the boilers with water, get up steam and proceed as before: whereas, it is impossible to use the electrical apparatus with anything but electricity.

As far as first cost is concerned, the average of a number of costs of installation which have come to my knowledge, show me that the air plant is from twenty-five to fifty per cent cheaper, depending upon the nature of the installation, the size of the power and the distance of the transmission.

As a general rule, the ordinary free gold milling mine in the State of California on a working basis would require motive power divided up nearly as follows:

Twenty-five per cent for the mill, 32% for the hoisting, 5% for direct acting pumps, 10% for station pumps, 23% for rock drills, and about 5% for lights.

Allowing that electricity to the amount of this 100% has to be purchased to operate this mine, using compressed air according to the manner that I have mentioned, I believe that there would be required about 74% in comparison to the electrical requirement, divided up as follows:

Twenty-five per cent for the mill, 10% for the hoist, 3% for the direct acting pumps, 13% for the station pumps, 16% for the rock drills, and 7% for the lights, making a total of 74%.

My opinions in the matter are somewhat borne out by the experience of electrical engineers themselves. For instance, in an article written in a pamphlet called "Stone," the following remark is made:

"You may not know that Mr. Thos. A Edison, the greatest electrician of the present time, has been for the last two or three years experimenting on a mammoth scale at Ogden, N. J., in which he quarries a low grade of iron ore, hoists and conveys the same by means of two cableways, delivers to the crusher, and after being crushed the material is gradually reduced to a powder, when by electrical process the particles are separated from the particles of stone, the iron particles being then compressed in the form of bricks and sold as a high grade iron ore.

Mr. Edison's quarrying operations involve the use of hoisting engines, drills, pumps, etc. Mr. Edison tried the Edison drill, which he told the writer he never saw until it was delivered to his quarry. The electric drill is being thrown out and the steam drill employed, though electric motors are used somewhat in the mill still. On all their hoisting apparatus steam hoisting engines are employed. Now it seems that until Mr. Edison can successfully use electricity in quarrying operations, it is useless for others to waste their time experimenting in this line. For anything like intermittent hoisting with a derrick, the electric hoist is not nearly so economical or efficient as steam hoisting engines."

I may add that for this same quarrying work it has been found recently at Jerome Park, in New York, where a very excellent compressed air plant has been installed by an Eastern compressed air engineering concern, that they are operating hoisting engines and rock drills very much cheaper by compressed air than they formerly did by steam.

Statements are made, which I have no means of verifying, that it is done with one-half the coal formerly required when steam was used direct. The contractor is making a large excavation, covering probably a square mile in extent, for a reservoir. He has established in the center of the work a 500 H. P. air compressor and is driving fourteen hoisting engines and fourteen rock drills at various parts of the work, and reheating the air prior to its use in the hoisting engines. The economy of this plant is so marked that at the present time a contractor in Philadelphia is installing a similar plant for work to be performed there.

These results seem to point to the fact that where steam, directly generated, cannot compete with compressed air it is useless for any other power to try to do so under the same conditions. It all lies in the fact that the work is intermittent and that is the principal claim made on this present occasion, that in determining the character of the power to be selected for any kind of an operation many things beside the efficiency of the apparatus at full load and constant operation, are to be considered. Very frequently a compressed air or water power plant, capable of storage capacity, would be more economical to use at a constant load efficiency of ninety. It is like the cost of a manufactured article, it matters very little what the rate of wages paid, provided the amount of wages which enters into the cost of the product be satisfactory. So it is in a power proposition, it is not the efficiency of five minutes operation, it is the total cost covering twenty-four hours.

From an engineering standpoint, if one were asked the most economical steam motor to operate an electric street railway plant, one would say, a compound or triple expansion Corliss engine, running condensing. But this depends entirely upon the cost of the coal, for it has been proved in parts of the United States where coal is as cheap as $1 per ton, that the difference in interest and depreciation between the condensing plant and the simple high pressure plant will more than offset the difference in the cost of fuel, even if the coal cost $1.40 a ton. This is an instance where high efficiency engines are not engines of great economy, and I have been particularly emphatic upon this point, because compressed air has suffered much on account of improper comparison with electricity in this manner.

We all know that there have been constructed electric generators and motors that will give an efficiency of from 92 to 95 per cent at full load, while compressed air generators and motors fall below these figures in mechanical efficiency, but in practical economy for such work as we have had in consideration, I claim 25% superiority in economy over the electrical installation. Mechanical operations are not conducted for amusement, but for profit, and that operation which produces equal results with another, for a less monthly or yearly cost, labor, material, fuel or power, interest depreciation, etc., being all given their proper value, is the more economical.

I claim that compressed air, for intermittent work (which is fully 50% of all work done by motors), has no rival for general economy or utility, and particularly is this true for mining work. It must always be borne in mind that economy in compressed air depends upon reheating, and then expansion, and my remarks are not directed towards that class of compressed air motors which use cold air or air at full pressure. Utility very frequently overbalances considerations of economy or efficiency, as may be illustrated in the air brakes which are attached to the locomotives throughout the world. These air brakes are most uneconomical in the use of steam, using it practically at full pressure, and are about the same class of motors as the direct acting steam pumps which have an efficiency of only about 20% as compared to a high class steam motor. I have heard it stated that there are 20,000 of these air brake motors working in the United States alone, absorbing about 10 H. P. each, making 200,000 H. P. devoted to this appliance alone, which completely overshadows all the rest of the compressed air installations in this country in magnitude, and yet no one hears of anyone attempting to replace this very inefficient motor with any other more efficient appliance for generating compressed air, for its utility is such and there is so much dependent upon it, that economy is a secondary consideration.

At the present time in the Eastern States there is a very marked revival of interests in compressed air, with reference to its application to street car motors. A considerable amount of money has been expended in experiments by two companies in New York City, during the last year which has resulted so favorably for compressed air motors that many street railway companies throughout the United States are preparing to make experiments on their roads, in order to determine the relative merits for their particular purposes of compressed air as against the cable or electricity.

Within the last month a car has been running in the streets of Washington, D. C., but I have not had any reports from it as yet. About this time the most elaborate experiment of all, namely, the running of a train drawn by a compressed air motor, will start from Rector street, New York City, and run to 58th street, on the 6th ave. elevated road at regular intervals. A 250 H. P. plant has been installed at a convenient point near one of the terminals and every precaution has been taken to insure the successful termination of this trial. This plant will undoubtedly be open to public inspection, so that all may satisfy themselves.

The struggle between the electric and the compressed air system, for supremacy, will not, as I have indicated before, be based upon the efficiency of engines or motors, but upon the general economy of the plant. This can be readily appreciated when we consider actual figures in connection with the operations of these plants. For instance, in a recently published report, of the operating expenses of twenty electric roads in Connecticut for 1896, the average cost of motive power and line repairs per car mile, for twenty of these roads, was three cents. With the compressed air system, with coal at $2.75 per ton, water at $1 per thousand cubic feet, or waste, the labor repairs and maintenance of power plant, depreciation and interest on the cost of the entire power plant, makes the cost per car mile, of the motive power, $0.023. In either of these plants the cost of coal per car mile does not exceed $.005, or an average of about one-fifth of the cost of the motive power, so that one can readily see that engines and motors of even medium economy would not effect the cost of the motive power to any perceptible extent, provided that the cost of maintenance was low, in fact maintenance is the principal expense in the motive power department, and what everybody is looking for at present is a system which places the cost of maintenance at the very lowest point.

My remarks become less true as the price of fuel increases, until of course there would come a point when the price of fuel would be the principal consideration. I should judge that on this coast we were about midway between these two factors.

While in New York and during this past month of April, 1897, I have had the pleasure of witnessing some experiments and of experimenting myself, with liquefied air, which I believe in the future is to be called "Aerine."

In one or two laboratories in Europe, air has been liquefied in extremely small quantities, but nothing of importance has been learned of its properties or of its possibilities in physical or engineering economy.

(*To be Continued.*)

Scientific Progress.

Comets.

In the field of the newer astronomy perhaps the most interesting work is that associated with comets. It must be confessed, however, that the spectroscope has rather increased than diminished the mystery which, in some respects, surrounds the constitution of these bodies. The older astronomy has satisfactorily accounted for their appearance, and we might also say for their origin and their end, so far as questions of origin can come into the domain of science. It is now known that comets are not wanderers through the celestial spaces from star to star, but must always have belonged to our system. But their orbits are so very elongated that thousands, or even hundreds of thousands, of years are required for a revolution. Sometimes, however, a comet passing near to Jupiter is so fascinated by that planet that, in its vain attempt to follow it, it loses so much of its primitive velocity as to circulate around the sun in a period of a few years, and thus to become, apparently, a new member of our system. If the orbit of such a comet, or in fact of any comet, chances to intersect that of the earth, the latter in passing the point of intersection encounters minute particles, which causes a meteoric shower. The great showers of November, which occur three times in a century and were well known in the years 1866–67, may be expected to reappear about 1900, after the passage of a comet which, since 1866, has been visiting the confines of our system, and is expected to return about two years hence.

But all this does not tell us much about the nature and make-up of a comet. Does it consist of nothing but isolated particles, or is there a solid nucleus, the attraction of which tends to keep the mass together? No one yet knows. The spectroscope, if we interpret the indications in the usual way, tells us that a comet is simply a mass of hydrocarbon vapor, shining by its own light. But there must be something wrong in this interpretation. That the light is reflected sunlight seems to follow necessarily from the increased brilliancy of the comet as it approaches the sun and its disappearance as it passes away.—From an address by Prof. Simon Newcomb.

A SYSTEM for the automatic lighting and extinguishment of gas jets from a distance is said to be in practical operation at Aix-les-Bains, France, having been developed by M. Egraz, director of the local gas works. The gas supply to each of the various burners in the system is controlled by an electric current acting on a special piece of inoxidizable steel, resting by its weight on

a seat in such a way as to close the orifice to the burner. The steel is moved to turn the gas on or off by magnetizing or demagnetizing, and, in case of turning on, the gas is lighted at the same time by either a spark or the incandescence of a special and practically infusible material.

Spontaneous Combustion.

The great number of fatal and destructive fires that take place, and many for which there cannot be any apparent cause assigned, is sometimes bewildering, but, says *Engineering*, when it is considered what a number of substances under certain conditions are capable of undergoing "spontaneous" decomposition with the production of the necessary amount of heat to effect their ignition, and withal the culpable ignorance and carelessness often displayed as to their proper storage, modes of conveyance and disposal, one cannot wonder at the inability of the authorities to elucidate the causes of so many fires. It is not always necessary that air should be present, or that there should be a gradual accumulation of heat, in order to bring about the "spontaneous" inflammation of a body. Substances that have their means of ignition often ignite or explode, out of contact with air, by mere molecular vibration, produced by such effects as thunder, etc.

The causes which produce spontaneous combustion, that is, the combustion of a body by natural or unintentional causes, may be divided into three classes: 1. Heat resulting from the gradual oxidation of a substance. 2. Decomposition produced by accidental vibration or concussion. 3. Ignition by lightning or electric sparks. The classes 2 and 3 may not be considered by many as being the causes productive of what is generally known as "spontaneous combustion." In the writer's mind the inflammation of a body containing its own means of ignition, by the molecular vibration produced by such effects as thunder, or the heat generated by lightning or electric sparks accidentally produced, are quite as legitimate causes of "spontaneous combustion" as the accumulation of heat resulting from the gradual oxidation of a substance. In any case there is a predominating external cause, whether it be resulting from oxidation, friction or electricity, and the word "spontaneous" cannot be here used in its literary sense. By far the most frequent source of fires from "spontaneous combustion" are those which result from heat produced by the absorption of atmospheric oxygen.

A frequent source of fires is the "spontaneous" ignition of various materials more or less saturated with oils or fats. The following is a list of common materials of the class which, when containing oily matters and when under favorable conditions, will often ignite naturally: Waste, tow, rags, sawdust, shavings, cotton and woolen cloth, roofing felt, and, in fact, all porous combustible bodies containing any oily or resinous substance having an affinity for oxygen. All vegetable and animal oils have more or less affinity for oxygen, while those produced from the distillation of petroleum and shale are practically unacted upon by the element. The oils which oxidize in the air most rapidly are the vegetable drying oils, such as linseed, hempseed, poppy oil, etc.

THE committee on international mails of the postal congress has decided that natural history specimens and articles for scientific collections be admitted to the mails as samples. This will permit of their being sent at the rate of one cent for every two ounces, whereas at present it is necessary to pay five cents for each half ounce or fraction thereof.

THE human body is an epitome in Nature of all mechanics, all hydraulics, all architecture, all machinery of every kind. There are more than three hundred and ten mechanical movements known to mechanics to-day, and all of these are but modifications of those found in the human body. Here are found all the bars, levers, joints, pulleys, pumps, pipes, wheels and axles, ball and socket movements, beams, girders, trusses, buffers, arches, columns, cables and supports known to science. At every point man's best mechanical work can be shown to be but adaptations of processes of the human body, a revelation of first principles used in nature.

A New Element.

A new element, bythium, is announced in the *Electrochemische Zeitschrift* by Theodor Gross. A fused mixture of silver sulphide and silver chloride is electrolyzed in a nitrogen atmosphere, using platinum electrodes free from iridium. In the melt is found a dark gray powder, insoluble in aqua regia and in ammonia. Fused with alkaline carbonate it gives a melt soluble in hydrochloric acid, from which hydrogen sulphide gives a brown precipitate. The yield of the new substance is 5 per cent of the original sulphur used. From the fact that there is a corresponding loss of sulphur, the author considers that this bythium is formed by the decomposition of sulphur, though he admits that since there is a small (3 per cent) loss of chlorine in the electrolytic reaction, it is possible that bythium may be formed by the decomposition of chlorine. An atomic weight determination will be looked for with interest.

AT the biennial congress on Weights and Measures, held last month at Paris, the discovery was announced of a new alloy of iron and nickel. This new material expands under the influence of heat less than any known alloy. Dr. Charles Guillaume of Neuchatel, the discoverer, prepared at the Imphy Works of the Commentry-Fourchambault Company a mixture of 36 parts of nickel and 64 parts of iron. Its extensibility is not more than one-tenth that of platinum. For measuring appliances that are subjected to changes in temperature, the discovery is of great importance.

Electrical Progress.

Electric Motors in Railroad Shops.

Recently the completion of the long-distance transmission line between Folsom and Sacramento, Cal., has placed it within the power of the Southern Pacific railroad to use electric motors in their shops at Sacramento with most satisfactory results. In their operation the motors have already shown considerable economy over the steam plant which they superseded.



FIG. 1.—TRANSFER TABLE IN SOUTHERN PACIFIC RAILWAY SHOPS, SACRAMENTO, CAL.

Three motors are used. The first is a direct-current motor, placed upon a table transfer used for shifting the locomotives. This motor is a G. E. 800, similar in every respect to those used on the ordinary trolley car, and is driven by a 500 volt railway current from the station. It is so geared that it operates, not only on the table, but also drives a drum carrying a wire cable used to haul the locomotives upon the table. This it does with perfect ease, hauling all sizes of locomotives. Instead of taking the current from the overhead wire by means of a trolley, the conductors are laid in an underground conduit and the contact is made by means of a plow running in this conduit. Some fears were at first expressed as to the result in rainy weather, but although considerable rain has fallen since the installation of this motor, no difficulty has been experienced. The transfer table and motor are shown in Fig. 1.

The motor used to operate the machinery in the boiler shop, as well as in the tender shop, is a 50 H. P. motor, driven by 440-volt current from the step-down transformers. The machinery in these shops is peculiar, in that each machine is provided with a heavy flywheel for carrying it over the sudden shocks which occur in punching and shearing and similar work. For three or four minutes the motor has an excessive amount of work thrown upon it in starting the machine from idleness and until the maximum speed is acquired. The load then drops to 30 H. P. Such sudden drops as this are calculated to demoralize motors of ordinary construction; with the induction motor the drop in the load is hardly noticed.

Fig. 2 shows the interior of the spring shop driven by a 10 H. P. motor; this motor also has to cope with sudden heavy loads. In this shop all the springs—spiral, elliptical and leaf—used in the construction of locomotives, etc., are made, and the most difficult piece of work done is the making of the spiral springs, some of which come to the machine as a bar of red hot iron, 1¼ inches in diameter. This, placed in the machine, is instantly wrapped around a mandril, and it is such work as this that throws for a few seconds an enormous load on the motor. Although it has been in use for some time, it shows no sign of strain.

The two motors last named are of the General Electric Company's three-phase induction type, without commutator, collecting rings or brushes. They are driven by 440-volt, three-phase alternating current from the transformers, which step down the 11,000-volt current transmitted twenty-four miles from the generating station at Folsom. This installation is only one of many made since the completion of the transmission from Folsom to Sacramento, which latter city is rapidly becoming dependent on electricity as its chief motive power.



FIG. 2.—INTERIOR OF SPRING SHOP, SOUTHERN PACIFIC RAILWAY SHOPS, SACRAMENTO, CAL.

CALIFORNIA is the present seat and center of large enterprises in electrical transmission. In the past three years several such schemes have been successfully planned and carried out, and, as previously noted herein, the question of distance is made a secondary consideration. At a pressure of 33,000 volts the Southern California Power Co. now proposes to transmit electrical power eighty miles. Contracts for considerable of the work have already been let, and operations have begun. The high voltage and the distance of transmission will attract world-wide attention, and every detail of the work will be of universal interest to electricians.

RUSSIA appears to be carrying out her traditional policy of stimulating the growth of internal industry by developing the arts depending upon electricity; an account of the extent to which progress in this direction has been made is given in the issue of *Die Elektricitat* for March 13. In order to encourage the development of electrical industries, liberal concessions have been made to foreign corporations, both for lighting and for tramways, while the installations thus operated are being made the subject of earnest study by Russian technologists.

CARL BARUS has measured the amplitude of the vibrations of a telephone diaphragm, says *Electricity*, and finds them to be less than one-millionth of a centimeter (four ten-millionths of an inch). Lord Rayleigh found that the vibrations of air of minimum audibility were considerably less, and that those of a whistle measured at a distance of half a mile from their source are only 8.1 one hundred millionths of a centimeter (twelve billionths of an inch).

AN American syndicate has secured control of the street railways of Monterey, Mexico, with a view of consolidation and then equipping them with electricity. About $6,000,000 is involved in the transaction.

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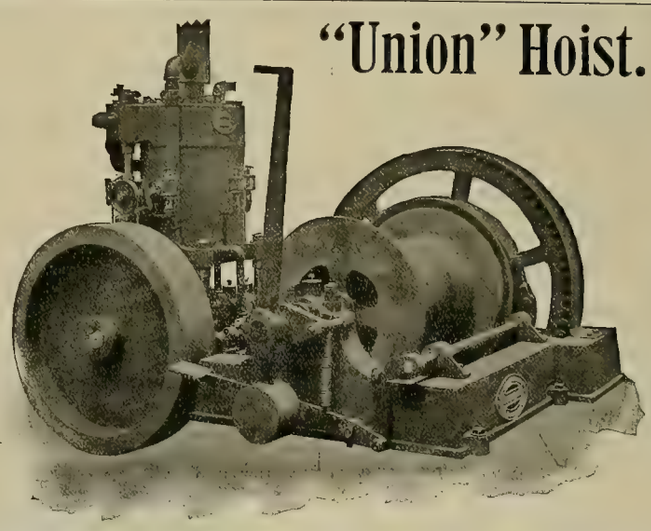
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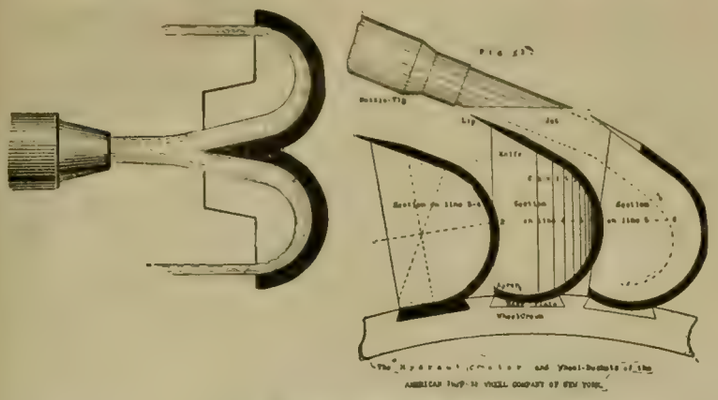
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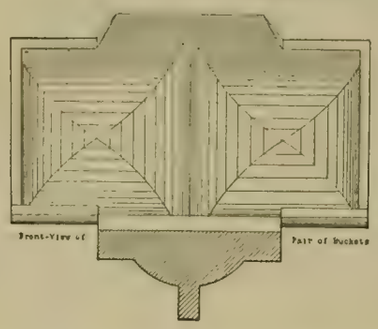
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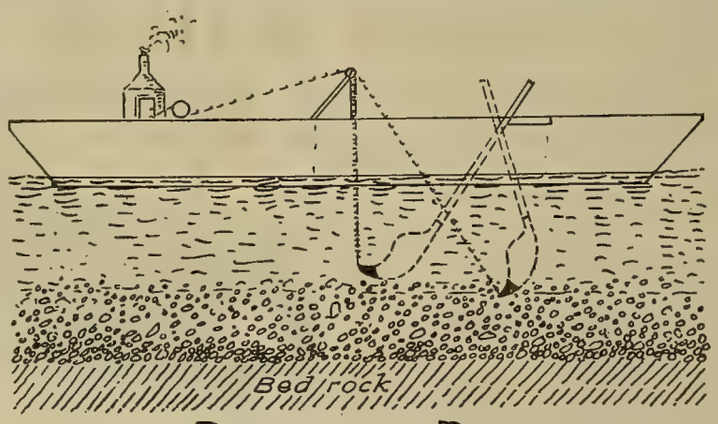
The question of dredging the beds of streams for gold is becoming of considerable importance, so far as the amount of money and effort being expended is concerned. There have been built and operated during the past two or three years in British Columbia, Idaho, Montana, Colorado and California certainly over a score of dredgers, which have cost from $5000 to $40,000 each. A majority of these dredgers have been total failures, a few partial successes, and three or four have been so successful that they are paying their way. In some cases the trouble has been with the dredgers mainly, while in others the main difficulty has been with the rapid current or large boulders.

Many inquiries have been made as to the work done by the Distlehorst-Barton dredger, now working on the Klamath river, in Siskiyou county, and which is proving a success, although the current of the Klamath is very rapid.

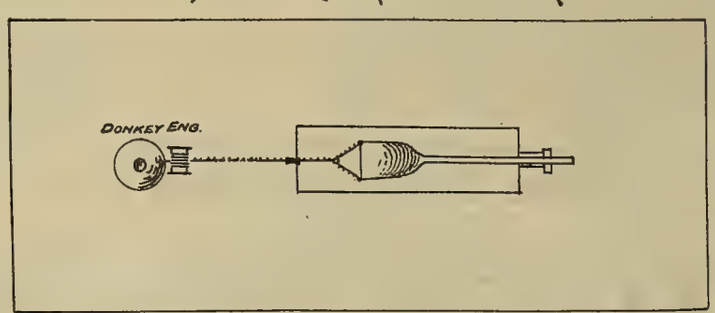
This dredger was built near Oak Bar, on the Klamath, last September. It consists of two flat boats 67 feet in length by 37 feet wide, joined together as one, upon which the machinery is operated. Between these boats is an opening about 8 feet wide where the dredger works. This consists of a large iron and steel scoop weighing about 1900 pounds, which is dropped through the opening of the boat into the water, thence to the gravel and boulders, working its way gradually by hoisting the dredge full of gravel at the rate of about forty trips to the hour until it reaches the bedrock. It continues hoisting bedrock and gravel and dumps it into a perforated grizzly that is kept in continual motion by machinery just over the sluice-boxes. Water is hoisted by a small Chinese pump over the grizzly onto the gravel which separates the fine gravel and gold into the sluice-boxes, running the large rocks over a platform, either back into the river outside of the boat or else into a derrick-tub used for that purpose which conveys and dumps the large rocks, 40 or 50 feet away from the boat, into the water or on the shore. The dredge will hoist up a cubic yard of gravel each time, and often hoists boulders weighing five and six tons.

The machinery is run by an engine of 25 H. P. The water for sluicing is pumped. The dredger is run day and night, three men being required for each shift. The daily average expense, including labor, fuel, etc., is $18. The gravel can be worked to a depth of 40 feet; a body of gravel from 10 to 25 feet is preferred. In such places from 400 to 500 cubic yards of gravel can be handled every ten hours. The cost of the dredger is about $7000 to $8000.

The accompanying cut represents a dredger built on the plan of that on the Klamath described above, and was worked on the Sacramento river above Redding.



DIESTELHORST DREDGER.



United States Coal Production.

The compilation of the statistics of coal production in the United States in 1896, which has just been completed by Statistician E. W. Parker of the United States Geological Survey, shows that the product in 1896 was 190,639,959 short tons, valued at $195,557,649, against 193,117,530 short tons, valued at $197,799,043, in 1895, a decrease of 2,477,571 short tons in amount and of $2,241,394 in value. The decrease in product was entirely in that of Pennsylvania anthracite. The output of bituminous coal shows an increase of about 1,750,000 tons. The anthracite product of Pennsylvania decreased nearly 4,250,000 tons. It is a notable feature, however, that there was a decrease in the value of the bituminous product of over $1,600,000, notwithstanding the increased output, and that there was a comparative increase in the value of anthracite, although, on account of the smaller production, it did not equal the value in 1895. The average price obtained for anthracite at the mines increased from $1.41 in 1895 to $1.51 in 1896. The average price for bituminous declined from 86 cents to 83 cents.

Among the important bituminous coal producing States, Pennsylvania, of course, stands first, with an output of nearly 50,000,000 tons. Illinois is an easy second with nearly 20,000,000 tons, or more than 75 per cemt of the combined product of Vest Virginia and Ohio, which come third and fourth respectively. The race between Ohio and West Virginia was very close in 1896, there being but a thousand tons difference and the output of each nearly 13,000,000 tons. These four States yield about 70 per cent of the total bituminous production.

Pennsylvania's bituminous product was a little more than a million tons less than in 1895. Ohio lost 480,000 tons. West Virginia increased her output about 1,500,000 tons, and Illinois about 2,000,000 tons. The other im-

portant States showing increased production were Alabama, Arkansas, Colorado, Indian Territory, Kentucky, Maryland, and Texas, while Indiana, Iowa, Kansas, Missouri, Montana, New Mexico, Tennessee, Utah, Virginia, Washington and Wyoming showed decreased production. West Virginia had the most important increase among the Appalachian States, Illinois in the Middle West, and Colorado was the only State in the Rocky Mountain region whose production increased.

The production by States is shown in the following table:

COAL PRODUCT OF UNITED STATES IN 1896 BY STATES.

States.	Total Production. Short Tons.	Total Value.
Alabama	5,745,617	$ 5,171,055
Arkansas	669,374	743,577
California and Alaska	93,776	220,523
Colorado	3,139,078	3,630,652
Georgia and N. Carolina	246,359	179,770
Illinois	19,786,626	15,809,736
Indiana	3,905,779	3,261,737
Indian Territory	1,366,646	1,918,115
Iowa	3,954,028	4,624,022
Kansas	2,764,801	3,175,032
Kentucky	3,183,478	2,496,806
Maryland	4,143,936	3,299,928
Michigan	92,882	150,631
Missouri	2,331,542	2,518,194
Montana	1,484,445	2,176,422
New Mexico	622,626	930,381
North Dakota	78,050	84,908
Ohio	12,875,202	10,253,461
Oregon	101,721	294,564
Penn'a Bituminous	49,101,148	35,024,918
Penn'a Anthracite	53,771,890	81,415,785
Tennessee	2,658,606	2,276,795
Texas	544,015	896,251
Utah	418,627	500,547
Virginia	1,254,723	848,851
Washington	1,195,504	2,396,078
West Virginia	12,876,296	8,336,685
Wyoming and Nebraska	2,233,184	2,918,225
Totals	190,639,959	$195,557,649

Coast Industrial Notes.

—There are 133 oil wells in California.

—A direct line telephone is building between San Francisco and Redding, Cal.

—A direct line of broad gauge railroad is building from Truckee, Cal., to Lake Tahoe.

—The first of California's wheat crop of '97 is being harvested in San Luis Obispo county.

—Since the 1st inst. the Southern California Railway Company pays but $1 per barrel for fuel oil.

—So far in the Senate tariff discussion California has received all her representatives asked for.

—Engineers have begun a survey of the proposed railroad to Ramona, in San Diego county, Cal.

—California men are buying beef steers in Nevada, paying $17 per head for two-year-olds, and $22 for three-year-olds.

—There are 3,000,000 pounds wool stored at The Dalles, Or. Twelve cents is the best offer this year.

—The total value of property in Los Angeles aggregates $58,000,000—an increase of about $6,000,000 over last year.

—Work began this week near Leavenworth, Wash., on the Great Northern railway tunnel through the Cascade mountains.

—This week the ship Moreton sailed from Tacoma, Wash., with 200 M. brick for South Africa, the initial shipment of the kind from this coast.

—Washington State reports the biggest wheat yield in its history. One Oregon county—Umatilla—reports a wheat crop of 6,000,000 bushels.

—The lumber mills of the Madera, Cal., Flume and Trading Company were burned last Monday. The mills gave employment to fifty men. The loss is estimated at $50,000.

—The Southern Pacific Company is negotiating for the purchase of the Visalia railroad, which is about eight miles long and connects Visalia with the Southern Pacific line at Goshen.

—Nearly eleven years ago a site was acquired for a new San Francisco postoffice. It is now hoped by the Government architect that preliminary work may begin on the new building next year.

—The Chino, Cal., beet sugar factory will this year spend $125,000 for crude petroleum fuel; will take $140,000 tons beets, extracting 18,000 tons sugar worth $1,365,000, paying the farmers about $500,000.

—As a result of personal investigation the California Labor Commissioner finds that 96 per cent of all the labor used in California beet fields is Chinese or Japanese, and that the latter are crowding the Chinese out.

—It is reported that the negotiations by which the Mount Lowe properties are to pass under the control of the Southern Pacific are progressing and a satisfactory arrangement is expected between now and August 1st.

—Representatives of the United States Government and a Hawaiian commissioner signed a treaty last Wednesday annexing Hawaii to the United States. The treaty will not be ratified by the United States Senate this session.

—B. F. Cheney, the largest individual stockholder in the Santa Fe Railway Company, is credited with intention to buy the estate and assets of the San Diego, Cal., Town and Land Company, the value of which is fixed at $901,383.

—The Slocan branch of the Columbia and Kootenay railroad will be finished by the Canadian Pacific Railway Company by October 15, '97, giving all-the-year-round communication from the main line at Revelstoke, B. C., to Nelson and Rossland.

—The Southern California Power Company, which will generate electricity at Santa Ana canyon and convey power seventy-five miles to Los Angeles, has given to E. S. Phelan of that city, for $95,000, the contract to build the stone canal to convey the water to the power house.

—In New York last week was incorporated the Rio Grande, Sierra Madre and Pacific Railroad of Mexico, with a capital stock of $3,120,000. The company proposes to construct a road from Ciudad Juarez, in the State of Chihuahua, to Corralitos, in the same State, a distance of fifty-six miles.

—The schooner Emma and Louisa has sailed from San Diego, Cal., to exploit Jesse R. Grant's guano concession. The schooner carries lumber to Guaymas to partly pay expenses, and from there will go to Tiburon island to look for gold and guano, thence to Angel de la Guardia for the same purpose.

—The Pacific Coast Electric Transmission Association was organized in San Francisco this week. It comprises the Blue Lakes Water Company of San Francisco, Big Creek Power Company of Santa Cruz, Southern California Power Company of Redlands, Central California Electric Company, Sacramento Electric, Gas and Railway Company of Sacramento, San Joaquin Electric Company of Fresno, Power Development Company of Bakersfield, Portland General Electric Company of Portland, Or., Nevada County Electric Power Company of Nevada City and the San Gabriel Electric Company of Los Angeles. President, C. P. Gilbert; vice-president, H. H. Sinclair; secretary and treasurer, Robert McF. Doble.

Personal.

CHARLES D. LANE of the Utica has gone to London.

J. W. CAMPBELL of Bingham, Utah, is to go to the Cœur d'Alene country.

COL. A. E. HEAD of San Francisco has been in the Fort Steele country, British Columbia.

JOHN W. MACKAY is expected out soon to visit the Allison Ranch mine at Grass Valley.

J. E. LESTER has been appointed superintendent of the Gold King mine near Ward, Colo.

GEO. E. AMES, JR., is now the resident agent of the Union Iron Works in the City of Mexico.

W. S. STRATTON of Cripple Creek, Colorado, owner of the Independence mine, is in San Francisco.

JAS. A. ABBOTT has returned to Yreka, Cal., from a five months' sojourn in the New England States.

R. E. BROWN, who has been for some time making his headquarters at Spokane, Wash., has gone to London.

J. O. HARRON, general manager of the Parke & Lacy Company, is expected back from Australia next month.

WILLIAM S. EDWARDS has been appointed engineer for the owners of a large mining concession in Dutch Guiana, South America.

THE United States Treasury Department has selected James H. Humphreys for superintendent of the new postoffice building to be erected here.

PRESIDENT JORDAN of Stanford University has gone on the U. S. steamer Gedney to the Guadaloupe islands, off the Mexican coast, to make a study of the seals.

HENRY BRATNOBER has started for Alaska. Captain Thomas Mein is already there, and it is probable that Hamilton Smith will join them before the end of summer

Recently Declared Mining Dividends.

Champion Mining Company, Nevada City, Cal., 25 cents per share; payable June 15.

Mercur, Utah, $25,000; payable June 20. Total to date, $725,000.

Champion Mining Co., Nevada City, Cal., 25 cents per share; payable June 15.

The Tamarack Copper Mining Company, Michigan, $180,000; payable June 30.

The Calumet & Hecla Copper Mining Company, Michigan, $250,000; payable July 7.

Silver King Mining Company, Utah, $37,500; payable June 14.

South Swansea, Utah, $7500; payable June 21.

Homestake, South Dakota, $31,250; payable June 25.

The Ontario Mining Company of Utah, $15,000; payable June 30.

Commercial Paragraphs.

THE first plant of machinery installed at Puma City, Colo., has been put in at the June mine, and is of the Bolthoff type.

MESSRS. HEWITT AND REARDON have bought the interest of E. A. Rix in the business of the Rix Compressed Air Machinery Co.

THE Stanley Electric Manufacturing Co. now occupy the former quarters of the Grangers' Bank, northwest corner Battery and California streets, San Francisco.

THE Leadville and Chicago Gold Mining Company has put in a 10x12 hoist at their property. The machinery was furnished by the Colorado Iron Works of Denver.

THE Parke & Lacey Co., 21 and 23 Fremont street, San Francisco, this week installed at the Providence mine, Nevada City, the largest air compressor in the district, the entire plant weighs twelve tons, including a twelve-foot wheel.

THE Kansas City Smelting and Refining Company have a contract with the Southern Pacific Company to monthly carry 2000 tons of ore from its mines in Mexico to Galveston, El Paso and other points. The Kansas City Smelting and Refining Company owns and operates several large mines in Mexico, and one of its smelting works is situated at El Paso. Much of the ore is destined for the latter place for refining, although some of the ore is exported by way of Galveston, but most of the refined product finds its way to New York for export.

THE Replogle Governor Works of Akron, Ohio, have recently placed considerable of their work on this coast, their governor being used by the San Joaquin Electric Company, the electric plant at Redlands, and at the Portland General Electric Company's plant at Oregon City, Oregon, where five of the Replogle governors are used. They have likewise put in some at Folsom, and several of their smaller governors have been used by the Pelton Water Wheel Company. They are now equipping a large electric light plant in Canada and sending two of their largest type of governors to a large electric plant in South Carolina; three more are going to British Columbia.

Recent California Mining Incorporations.

Excelsior G. M. & M. Co., San Francisco; W. S. Chapman, V. E. Mathews, J. I. Minear, L. H. Smith, G. Searle; capital stock, $500,000; subscribed.

Rodman Hill Mining Co., San Francisco; F. F. Weed, G. L. Fitch, G. P. Rixford, A. E. Williams, H. F. Lange; capital stock, $100,000; $5000 subscribed.

Milkmaid M. Co., S. F.; J. P. Jones, H. M. Gorham, W. E. Lester, D. B. Hunt, T. Anderson, J. B. Low, A. Waterman; capital stock, $10,000,000; subscribed, $3500.

Indianapolis and Canyon Springs G. M. Co., Los Angeles; A. C. and W. C. Hogaboom, E. E. Bowles, Los Angeles, and W. H. Webster and G. R. Wysong, Indianapolis, Ind.; capital stock, $1,000,000, all subscribed.

Golden Dexter Mining Company, Marysville, Cal.; F. W. Johnson, C. E. Swezy, G. W. Harney, C. Hapgood, W. S. Johnson; capital stock, $100,000; subscribed $69,400.

Acme Oil and Mining Company, San Francisco; F. Lux, B. S. Spencer, A. F. Imbrie, G. H. Lux, S. W. Dixon; capital stock, $50,000; subscribed $1000.

Doyle G. M. & M. Co., San Francisco; W. R. S. Fox, A. W. Bogart, C. D. Olney, L. B. Doe, C. E. Elliott; capital stock, $1,000,000—subscribed, $25.

Obituary.

While en route last week from South Africa to England "Barney Barnato" jumped from the steamship and was drowned. Thus ends the wonderful career of this extraordinary man. Isaac Bernstein was born in London in '52, was in youth a strolling actor, went to South Africa as a juggler, got a little financial foothold, acquired control, went into mining schemes on the most extensive scale, dazzled Europe with the magnitude of his operations, made himself worth many millions of pounds sterling, inaugurated an era of extravagant speculation, enriched and beggared thousands—and now the dismal end. The "Kaffir stocks," which in the past year have so greatly shrunk in value, have experienced further disastrous collapse since the news of his death.

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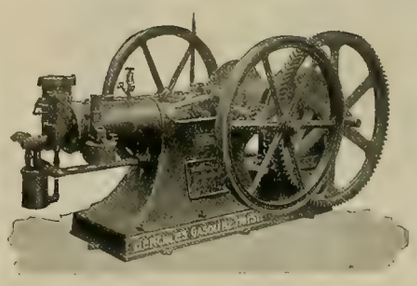
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Why the Springer Concentrator is the Best:

It will do more and cleaner work than any rubber belt machine.
It weighs only one-half as much as some of the six-foot concentrators.
Is the most simple in its construction of any machine in the market, and only one-third as many pieces in it as in some of the others. Was invented by an old miner of forty years' experience handling every known concentrator on the market.
Should any piece need repairing, it can be removed without disturbing any other part of the machine.
Can be set up by any inexperienced miner.
Its distributor is perfection itself, distributing the pulp evenly over the entire surface of the belt.
Grade of shaking frame can be changed while the machine is running at full speed.
It is the strongest, lightest running and most inexpensive to keep in repair of any
Will save more of the fine slimes than any other machine.
Is cheaper than any other six-foot machine, costing only $350.00 f. o. b. cars or boat, San Francisco.
Will handle the pulp from five stamps better than any other Concentrator.
Has adjustable eccentrics, and any length of stroke can be had, thereby giving different speeds per minute.
The belt is very durable, being made of No. 3 Canvas, woven especially for the Springer concentrator.
This machine requires so little attention that one man will easily attend to a dozen of them.
It has a solid rubber flange, which no other canvas belt has.
Wear and tear upon this machine is not one-third as much as upon some of the other concentrators.

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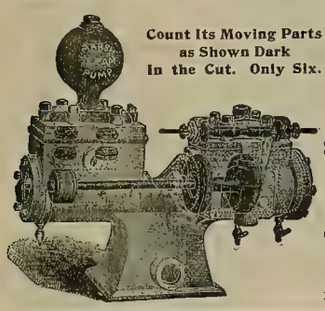
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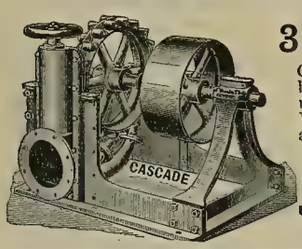
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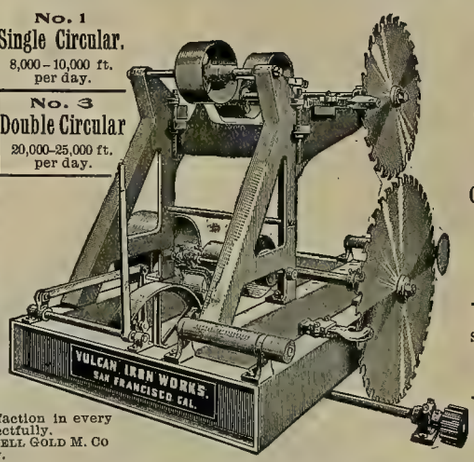
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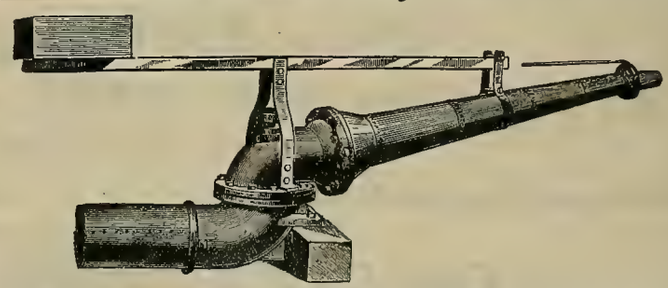
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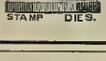
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A Great Mining Triumph.

Capt. J. R. DeLamar, of New York City, is one of the largest owners and workers of Gold Mines in the world. After the most careful investigation he purchased in August, 1895, two Griffin Mills, and his report is so remarkable as to demand the careful attention of every one interested in Gold Mining. We give it in his own words.

NEW YORK, Jan. 9, 1896.

BRADLEY PULVERIZER CO. *Gentlemen:*—The two Griffin Mills have been in operation now for 100 days on the hardest rock, with the exception of corundum, that I have ever met during my mining life. They have taken the rock direct from the breaker and they average about 20 tons to each machine, 40 mesh fine, without crushing or bolting. We simply put a ¼ mesh screen around the Griffin Mill, and the stuff comes out 40 mesh fine or over, which makes it an excellent pulp for leaching by cyanide or chlorination; therefore we have concluded to order **10 more Griffin Mills.** We have tried high-speed rolls and dry stamps, and after looking into the Huntington Dry Pulverizer, the Naroid Pulverizer, the Stedman Pulverizer, the Frisbie Lucop, the Cook, and various other dry pulverizers, unhesitatingly recommend your Griffin Mill to any one.

Yours truly, (Signed) J. R. DeLAMAR.

HOW 10 GRIFFIN MILLS WORK.

DeLAMAR'S NEVADA GOLD MINING CO.,
SALT LAKE CITY, UTAH, Nov. 24, 1896.

BRADLEY PULVERIZER CO. *Gentlemen:*—In answer to your inquiry as to what the "Griffin Mill" is doing at our DeLamar Mill, DeLamar, Nevada, we beg to state that we often run 310 tons per day with 10 of your mills in operation, and on one occasion these 10 mills produced 408 tons in one day. I have no hesitancy in stating that they will regularly produce at least 30 tons per day each on our ore, which is extremely and unusually hard.

Yours very truly, H. A. COHEN, *General Manager.*

These strong letters coming from such representative men are conclusive evidence that we are right in claiming that the "Griffin Mill" will produce a larger amount of finer pulp at less cost than any other stamp or pulverizer made.

Let us send you a free copy of our illustrated pamphlet, which will tell you all about the Mill and bring to you other evidence of its great achievements.

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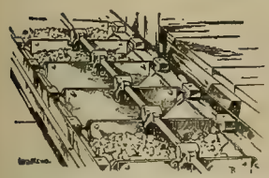


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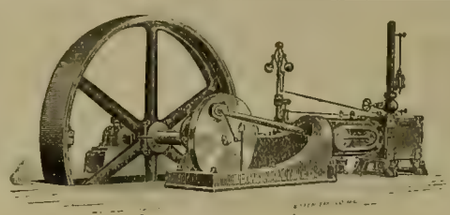
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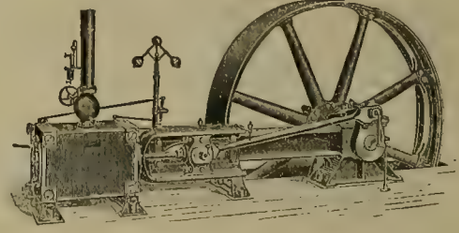
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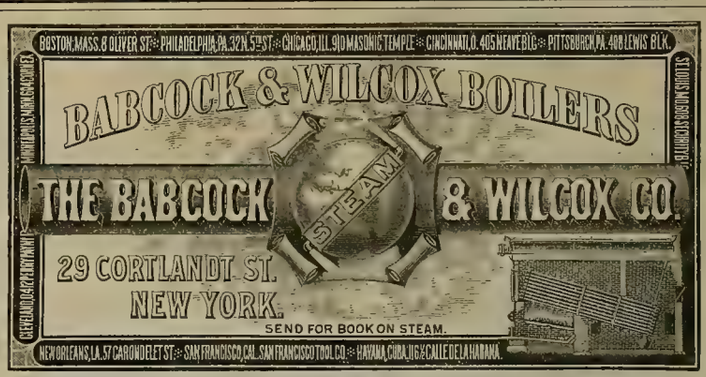
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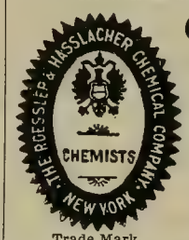
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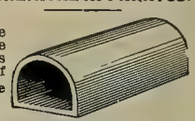
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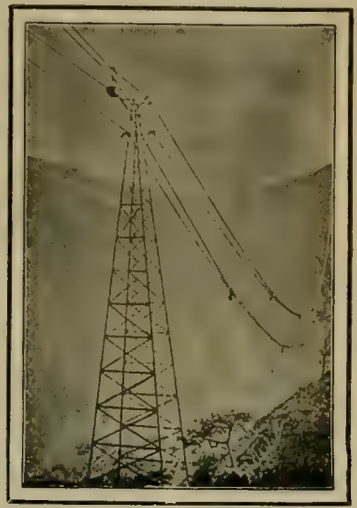
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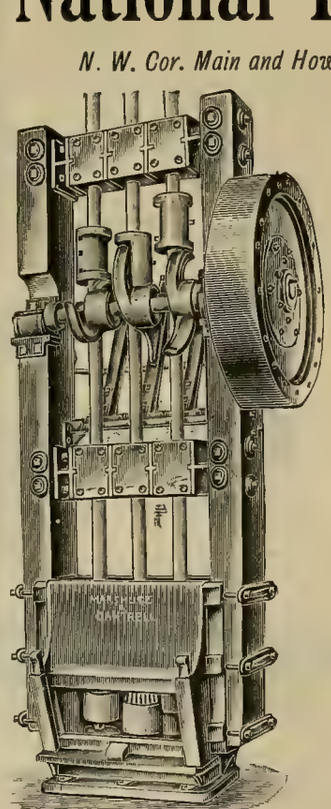
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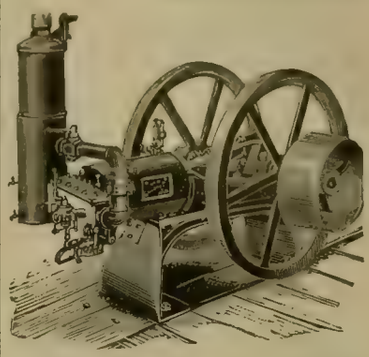
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List of U. S. Patents for Pacific Coast Inventors.

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FOR WEEK ENDING JUNE 8, 1897.

584,088.—SHIP ATTACHMENT—W. W. Beach, Los Angeles, Cal.
584,204.—DIAPER—L. Bowles, S. F.
584,205.—DIAPER—L. Bowles, S. F.
584,152.—MAIL-BAG CRANE—E. Campbell, Dayton, Wash.
584,153.—FIREARM—H. Carr, S. F.
583,981.—FRUIT GRADER—L. Cunningham, San Jose, Cal.
584,283.—CAR VENTILATOR—E. T. Earl, Oakland, Cal.
584,075.—AWNING—C. P. Fogh, S. F.
584,037.—EXCAVATOR—W. H. Fulcher, Stockton, Cal.
584,090.—FARM WAGON—B. F. Kent, Franklin, Or.
584,181.—SIGN—W. N. Ley, Wilbur, Wash.
584,080.—AMALGAMATOR—Litter & Vandre, S. F.
584,187.—DERRICK CRANE—McCabe & Anderson, Tacoma, Wash.
583,924.—ANIMAL TRAP—J. G. McCoy, Suisun, Cal.
584,008.—HOSE SPLICE—C. F. Munson, Los Angeles, Cal.
584,081.—PAN LIFTER—W. C. Nelson, Santa Rosa, Cal.
584,048.—BOTTLE—W. A. Papoun, Baker City, Or.
583,932.—SPECULUM—O. Penderson, Los Angeles, Cal.
584,020.—TEA INFUSER—J. H. Sutthoff, Seattle, Wash.
584,086.—ORE GRINDER—W. A. Woods, S. F.
584,087.—JAR SUPPORT—W. H. Wright, San Jose, Cal.

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Among the patents recently obtained through Dewey & Co.'s SCIENTIFIC PRESS U. S. and Foreign Patent Agency, the following are worthy of special mention:

FLOOR, ROOF OR SIDEWALK CONSTRUCTION.—Peter H. Jackson, San Francisco, Cal. No. 583,685. Dated June 1, 1897. The object of this invention is to provide improvements in covering the surface of either roofs, floors, sidewalks or other covered or vaulted spaces in which corrugated metal plates or sheets form the bottom, and are adapted to resist tensile strains when loaded, said sheets also being so constructed as to form retaining channels which are filled with artificial stone, concrete or Portland cement, and which may have a supposed covering or slabs of natural stode cemented thereon and wholly or nearly so above the neutral axis line, so that while the lower metallic portion is adapted to resist tensile strain, the upper surface is in like manner adapted to resist the compressive strains which take place above this neutral axis. The metal sheets forming the lower surface have retaining channels for the reception of a plastic filling of cement and a top surface cemented directly to the said plastic filling, adapted to resist compressing force, said metallic surface being formed in sections and channel irons forced upon the ends of the corrugated metallic sheets. A sheet metal covering fits over the junction line of the channel plates and has a filling of cement and superposed surface, twisted wire rods or plates with roughened or uneven surfaces stretched transversely across the top of the corrugated sheets and are embedded within the filling of plastic cement, thus aiding to form a transverse bond.

BULLET HOLDING AND EXTRACTING TOOL.—H. Rogers, Salinas, Cal., assignor to I. B. Tucker of same place. No. 583,693. Dated June 1, 1897. This invention relates to a device which is especially adapted for holding bullets when dipping them into any lubricant, and afterwards inserting them into shells during the process of loading, so as to make a convenient way for holding the bullets and placing them in the shell without soiling the hands. It consists essentially of handles pivoted together, a spring between the handles whereby they are normally separated, parallel-socketed jaws at the opposite side of the pivot which are normally closed by the spring and projecting gripping points extending beyond these jaws. These gripping points are turned inwardly to leave an annular groove or channel around the jaws between the points for the escape of surplus lubricant. They serve also to limit the projection of the bullet. Adjacent to and in rear of the hinge points of the jaws is a grip adapted to remove the bullet from the shell or to grasp the cleaning rod if it has become fast in the barrel of the gun.

ORE GRINDING MACHINE.—Wm. A. Woods, San Francisco, Cal., assignor of one-half interest to Solon Pattee, same place. No. 584,086. Dated June 8, 1897. This invention relates to a machine for grinding and pulverizing ores, which I call a "ball arrastra. It consists essentially in the combination of a grinding pan, having a rounded inner concave at the junction of the sides and bottom; a central vertical sleeve, a vertical driving shaft with a driver secured thereto and extending down into the pan, a die fitting within the pan having a space between it and the bottom, into which the amalgam or mercury may collect. Within this die are a series of balls, which run upon the die as a track or race. The driver is so constructed as to propel the balls, causing them to roll upon the die, and thus crush any material which passes between the balls and the die. A central feeding tunnel receives the material to be pulverized, delivers it down exterior to the central zone, whence it passes between the die and the balls, being constantly returned by suitable wings and thus circulated until it is sufficiently pulverized. Screen openings are suitably made around the pan to discharge the material when fine enough, and an annular trough receives it, and, by reason of its inclination as it passes around the pan, the pulp is carried away and discharged at any desired point. In order to increase the power of the balls, a weighted cap rests upon the top of them, this cap moving slightly around as the balls roll beneath it.

AWNINGS.—Chris P. Fogh, San Francisco, Cal. No. 584,075. Dated June 8, 1897. This invention relates to that class of awnings which are carried by swinging arms and are adapted by means of suitable mechanism to be let down to an inclined position for shading the part to which they are attached and again rolled up out of the way when not needed. The invention consists of a roller to which the lower edge of the awning is attached and to which it may be rolled, a fixed connection for the upper edge of the awning, swinging arms to the end of which the roller is journaled, so that it winds and unwinds the awning, and a line secured to and winding upon the periphery of the roller, adapted to unwind the roller to extend the awning, and a second independent line adapted to turn the roller and wind it up. This independent line passes freely over both sides of the awning and around the roller for this purpose; but where the awnings are adjacent to each other, one of them may be made in a plane slightly higher than the other and have the side arms extending over this other one, overlapping sufficiently to close the joint.

SEPARATOR AND AMALGAMATOR.—Peter Litter and Hippolyte L. Vandre, San Francisco, Cal. No. 584,080. Dated June 8, 1897. This invention relates to a process and apparatus which is especially designed for the separation of gold from black sand or other heavy material with which it is often found associated. This gold being in the form, in many cases, of light, thin scales, which an ordinary oscillating or shaking apparatus would not separate from material which is very similar in weight. This invention consists of shaking screen surfaces disposed at different levels, one in advance of the other, all pointing in the same direction, and upon which the sand and gold are distributed in thin strata. These screen surfaces have perforations of successively decreasing areas from first to last, whereby a separation occurs in each screen. In conjunction with this is an arrangement of perforated screens, whereby water may be discharged from a height above in a fine shower, falling vertically upon each screen and its contents, so that the gold and sand which are too fine to pass over the screen are driven through it. Each screen has a discharge chute delivering the coarse sand to the sides of the machine, and beneath is an inclined amalgamated plate, upon which the material which falls through the screen is received, and from which it passes to the next adjacent screen.

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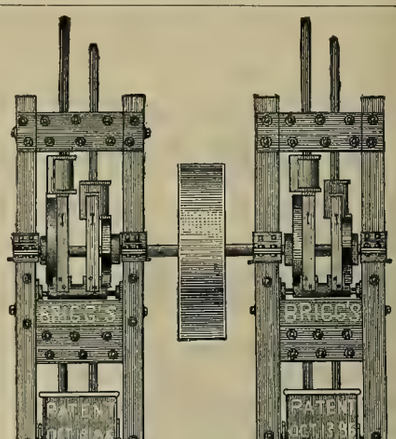
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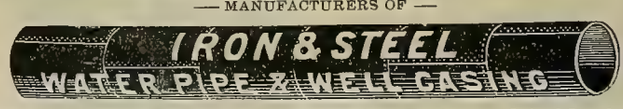
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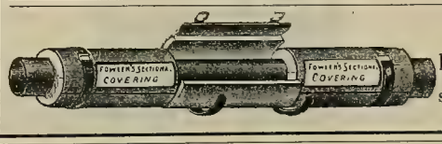
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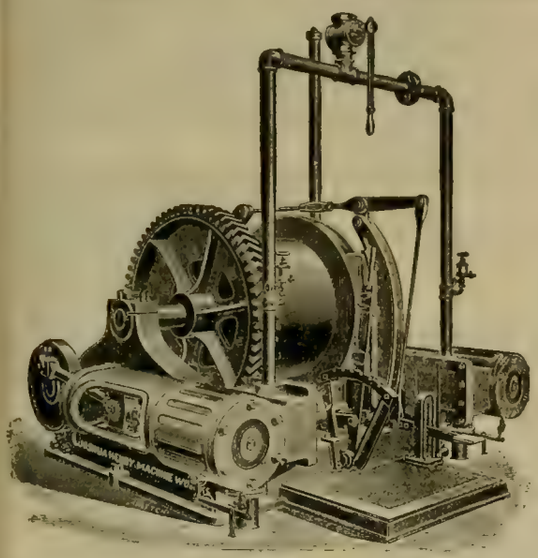
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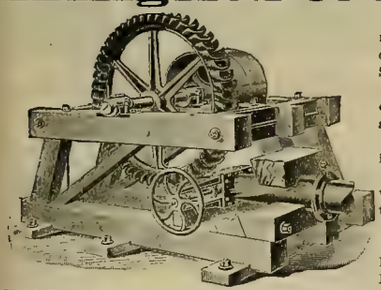
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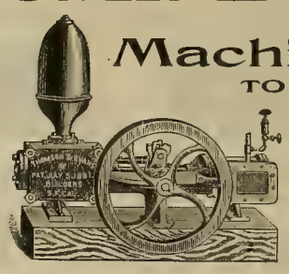
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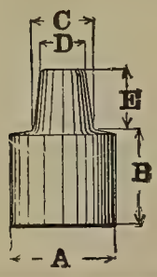
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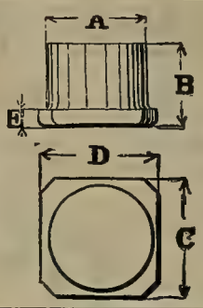
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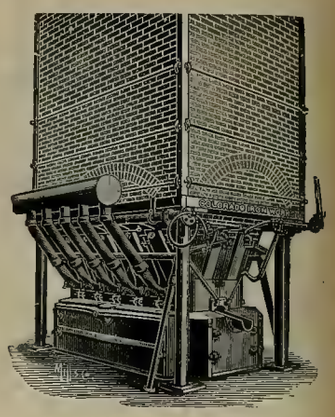
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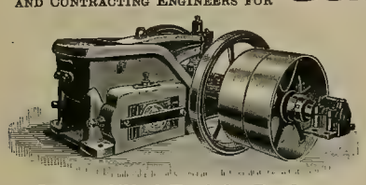
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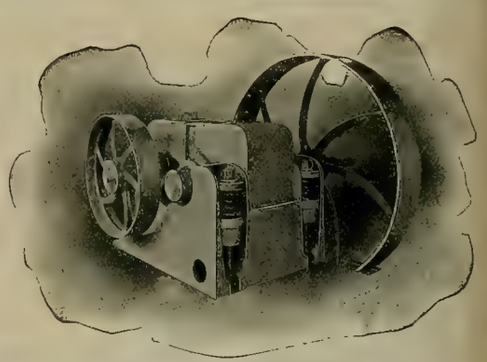
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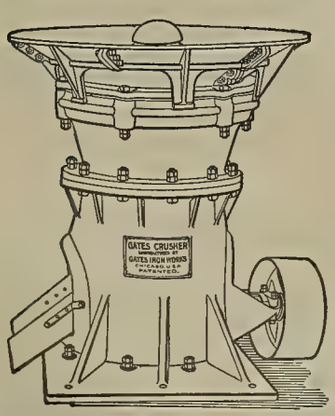


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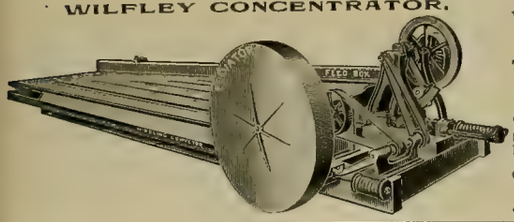
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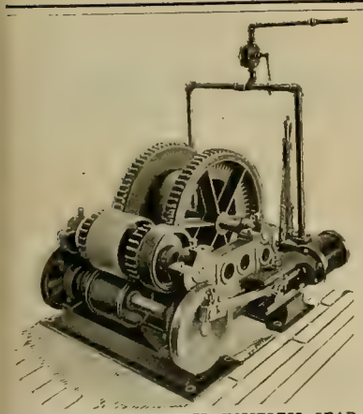
ASPEN, COLORADO, April 8, 1897.

The Mine and Smelter Supply Co., Denver, Colo.—GENTLEMEN: Your favor of the 5th inst. at hand and noted. In regard to the Wilfley Table I wish to say that I consider it to be the best device in use to-day for concentrating fine ores; that it will save everything that a gold pan will; that it combines the clean saving of a Rittinger with the capacity of a buddle. I think that without question it will supplant in time all other devices for handling fine and slimy ores. This includes all the vanning machines and buddles.

This is higher praise than I am in the habit of giving, but I feel sure that it is deserved, and you may make any use of this that you desire. Yours very truly, [SIGNED] S. I. HALLETT.

These Tables have displaced belt tables of almost every make, as is shown by letters in our possession.

PRICE, $450.00.



6x8 BOLTHOFF COMBINED NOISELESS GEAR AND FRICTION HOIST.—Pat. Oct. 6, 1896.

"Things are in shape to push."
—*Gen. Sheridan to Gen. Grant.*

"Push things."
—*Gen. Grant to Gen. Sheridan.*

WE HAVE IN SHAPE TO PUSH OUR NEW

Botlhoff Combined Noiseless Gear and Friction Hoist.

It is pre-eminently the

STRONGEST, MOST DURABLE, COMPACT and ECONOMICAL

Small Hoisting Engine Ever Built.

"IT'S A GOOD THING. PUSH IT ALONG!"

WRITE FOR DESCRIPTION AND PRICES. MENTION THIS PAPER.

HENDRIE & BOLTHOFF M'F'G CO.,

Denver, Colorado, U. S. A.

W. H. BIRCH & CO.,

Office and Works, 127-129-131-133-135 First Street, San Francisco, Cal.

WRITE FOR A CIRCULAR ON THE

"BIRCH" IMPROVED TWO-STAMP MILL.

IRON FRAME, TRIPLE DISCHARGE, 850-LB. STAMPS, FORGED STEEL SHOES AND DIES.

Price, $450 f. o. b.

Manufacturers of the LIGHTNER QUARTZ MILL.

Market Reports.

The Markets.

SAN FRANCISCO, June 17, 1897.

Jobbers state that for the season general business not only holds up but is showing a steady expansion. Harvesting causes a freer call for goods which will enlarge for the next two months. In prices no material change has taken place the past week. It appears to be the opinion that on nearly all lines in which advances have taken place, they will just about cover the contemplated increase in the tariff. With this opinion ruling dealers are not disposed to carry stock in excess of nearby trade wants. While this prevails yet it is undeniable that the better informed look for a decided improvement in general trade, and that the buying by distributors will be freer than for several years past. Many hold to the opinion that stocks will have to be enlarged very considerable so as to meet requirements. Manufacturers as a rule look forward with some degree of confidence to more active times, particularly with iron-workers. It is stated that the outlook is quite promising for more structural materials than for fully three years, owing largely to larger crops and lower transportation charges on farm products. The East reports a steady revival in business, with the belief prevailing that it will continue to enlarge for some time to come, but it is a disputed point how values will rule. The general opinion is that they will not be much higher, while in some lines there may possibly be some fractional declines.

In the local money market there continues an oversupply of funds, with the banks still exacting in their demands regarding security. It is the consensus of opinion with close observers of current events in commercial and financial circles that the situation will soon change, and that bankers will be as anxious to place funds as they are now to hoard coin. They think that confidence is slowly returning, and, after the tariff bill is out of the way, it will be more pronounced. There is more disposition here and at the East to speculate in leading industrial and railroad securities, which is a good sign. At the East the speculative mania in these kinds of securities seems to intensify, and, as it grows, it will only be a question of a short time before the general public will be drawn in, when general business will feel its beneficial effect. This is being felt already in iron, and there is an old saying that iron is the barometer of trade. New York advices report time loans higher and quite active, but short loans are practically unchanged.

New York Silver Prices.

NEW YORK, June 17.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	27⅛	59¾
Saturday	27⅛	59¾
Monday	27⅛	59⅞
Tuesday	27 9-16	60
Wednesday	27 9-16	60⅛
Thursday	27 9-16	60⅛

	Copper.	Lead.	Iron.	Tin.
Fri.	10 75 @11 20	3 30	10 00@12 25	13 60
Sat.	10 75 @11 20	3 32½	10 00@12 25	13 75
Mon.	10 75 @11 20	3 32½	10 00@12 25	13 75
Tue.	10 90 @11 20	3 32½	10 00@12 50	13 80
Wed	10 90 @11 15	3 35	10 00@12 50	13 80
Thur.	10 90 @11 15	3 35	10 00@12 50	13 80

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	17½c Prem
New York Telegraphic Transfer	20c Prem
London Bankers' 60 days	$4.87
London Merchants	$4.85
London Sight Bankers	$4.88
Refined Silver, peroz., 1000 fine	60½
Mexican Dollars	49@49½

SILVER.—The market has been steadily gaining at New York, with quite an advance to-day, but London is slow to respond. It is stated that the American markets have been quite a factor in sustaining values abroad. The latter seems to have been largely governed by offerings from this side. If this is the case, then it is reasonable to look for better figures abroad. It is quite impossible to learn on what the strengthening at New York is based, unless it is on private advices regarding the feeling abroad as to the movement for an international monetary convention. It is an open secret that the present administration is quite earnest in its efforts to bring it about, and, if accomplished, more favorable results are likely to follow than did any former convention.

MEXICAN DOLLARS.—The market is quiet but firmer, in sympathy with silver. Exchange is said to be more in favor of dollars. The London *Bullionist*, May 29, says: "There is some talk of the reopening of the Indian mints, but so far we have had no confirmation of the report. Money continues very tight in India, and as a consequence the Bank of Bombay has raised its rate from 9 to 10 per cent, being the same as that charged by the Bank of Bengal."

QUICKSILVER.—The market has been steady but firm.

Our market is quoted at $40.50 for domestic consumption.

COPPER.—Our market has held steady. New York mail advices report continued free outward movement, which has had a steadying influence. The American consumptive demand has been confined to actual wants, which do not show much enlargement.

The local market is quoted as follows:

Ingot, jobbing	—@14
Ingot, wholesale	—@13
Sheet copper	—@17
Bolt	¼ & 5-16, 20c; ⅜ and larger, 17

TIN.—Pig has been quite strong at the East, with further advances reported at New York. Light stocks and an enlarged consumption have favored sellers. The consumption in this country, it is said, shows an increase over the corresponding time in 1896. Our market is strong at quotations.

We quote as follows in a jobbing way:

Pig, per lb		14c@	—
Plate, I C coke, heavy, per box	$4 00@	4 15	
" " " light, "	3 90@	—	

LEAD.—While our market is not quoted higher, yet the indications point to better figures, in sympathy with the East, where the markets have made perceptible advances, closing quite strong.

Our market is quoted in jobbing lots as follows:

Pig	4 00	@	4 25
Bar	—	@	4 50
Sheet	5 62½	@	6 12½
Pipe	4 87½	@	5 37½

SHOT.—There is a fair demand, with a firm tone reported at the close.

Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

POWDER.—The demand from the mines continues active.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

BORAX.—The market is steady to firm.

The market is quoted as follows:

Refined, in carload lots, in barrels	5
Refined, in carload lots in sacks	4¾
Powdered, in car lots	5
Concentrated, "	4¼

IRON.—We are informed that more buying has been the order than for some time, in view of the improvement at the East. The consumption here is said to be increasing. The East reports large transactions for forward delivery, with sales made well into next year. This has had the effect of advancing the views of sellers and causing strong markets at the advance. Our advices indicate that the advances are apt not only to be maintained, but still better figures rule. The export movement is quite free.

AMERICAN.

	To Arrive.	Spot.
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50

ENGLISH.

Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—The market is without essential changes to report. Prospective tariff legislation has not, as yet, had any influence outside of steadying the views of holders.

We quote as follows:

SPOT FROM YARD—PER TON.

Wellington	$8 00@	—	
Greta	6 00@	6 50	
Nanaimo	6 50@	7 00	
Gilman	5 50@	6 00	
Seattle	5 50@	6 00	
Coos Bay	— —@	4 75	
Cannel	8 00@	—	
Egg, hard	12 00@	13 00	
Wallsend	6 50@	—	

TO ARRIVE—CARGO LOTS.

Australian	5 50		
Liverpool Steam	6 25		
Scotch Splint	—	—	
Cardiff	6 25		
Lehigh Lump	9 00		
Cumberland	13 00		
Egg, hard	10 00		
West Hartley	6 50		

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

ANTIMONY.—The market is steady.

Our market is quoted at 7¼@8¼c in a jobbing way. New York mail advices quote 7¼c for Cookson's, 6⅞@7⅛c for Hallett's and 6⅞@7c for Japanese.

NAILS.—The market is strong and active.

Wire, carloads, basis per keg		
" jobbing, " "	$2 35	
Cut, carloads, " "		
" jobbing, " "	2 25	

PLATINUM.—Very little doing.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC.—The market is firm at quotations.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady.

We quote in jobbing lots at 50 cents per pound for ingots.

Chemicals.

So far as we are able to learn, there is practically nothing new to report. Long-continued debate on the tariff by Congress admitted of such free importations at the East as to make stocks cumbersome. At this writing everything seems to be waiting, which makes new features hard to get.

SPELTER.—Eastern advices state that galvanizers have been buying quite free, which caused smelters to feel steady in their views.

We quote our market in a jobbing way at 5 cents a pound.

BISMUTH.—The market is steady.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is steady.

We quote in a jobbing way at 70 to 75 cents per pound.

BONEASH.—There is nothing new to report.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

SODA ASH, 58% (LeBlanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is slow at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—There is a slow demand at 2½c a pound from stores.

NITRATE OF SODA.—Market is quiet.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

SULPHURIC ACID.—The demand is light.

We quote in a jobbing way at 1¾c per lb for 66%.

NITRIC ACID.—Our market is reported steady from store at 6½@7c per pound in carboys.

BLUE VITRIOL.—Our market is quiet.

We quote in a jobbing way at 4½c per pound.

Mining Share Market.

SAN FRANCISCO, June 17, 1897.

The market strengthened slightly up to Monday and Tuesday mornings, with the Gold Hill shares, under the lead of Challenge, showing the largest percentage in the gain. In the north end shares Sierra Nevada exhibited the most strength, as did Chollar in the middle shares. Tuesday afternoon the market began to ease off, with Potosi suffering the most. Yesterday morning there was a further decline along the line, except Best & Belcher, which gained slightly on reports of an improvement on the 300-foot level on the Brunswick lode. In the afternoon Chollar and Potosi sold lower, causing a weakening in everything except Hale & Norcross, which held up well. It is reported that the strength in the latter is due largely to buying by one of the contesting parties in the suit for control of the mine; but there are other reports that it is due to buying by persons who expect an early decision—say, within the next three months—in the suit of Fox et al. against the old management. The way in which the market acts causes some surprise. It only emphasizes the fact that moneyed outsiders cannot be drawn in, owing to the management of some of the mines. The showing in some of the mines, prospects in others and the character of the work in about all ought to be productive of much higher prices, particularly with speculation reviving at the East, where quite a boom has taken place, and also greater activity and higher prices for local industrial securities in this city.

From the Comstock mines the news grows in interest at several points, especially the long west crossdrift run jointly by Confidence, Challenge and Con. Imperial. Last official advices state they had struck a flow of water. This is accepted as favorable particularly when it has been preceded by softer and more favorable formations, as it was in this case. This, no doubt, accounts for the strength shown the past week in Challenge for the insiders put it out that the crossdrift is in Challenge ground, although it was at first and for several weeks afterwards officially given in Con. Imperial ground. Perhaps the management had more Challenge shares than Con. Imperial to sell. Some talk is still heard of favorable formations in Sierra Nevada, which has strengthened the shares. The joint work that is being done by Crown Point, Kentuck and Yellow Jacket is being closely watched by mining men, as if it will result in anything good unless so willed by the management. In Utah the north drift is in porphyry, clay and quartz. They are making fair progress in extending west crossdrift No. 2 on the 900-foot level. Good things are expected of this drift, but it will take time. On the Layton tunnel they have repaired the north drift. On this level they are still driving ahead the west crossdrift. There is no change in the work underway in Union. In Mexican, the last official letter reports more favorable formation with a slight seepage of water in the northwesterly drift. The work in Ophir on the central tunnel and 1000-foot levels is practically unchanged. They are still driving slowly ahead on the north drift on the 175-foot level. Last week 134 tons of ore were extracted and raised by Con. Virginia. Car sample assays average over $76 to the ton. The company is milling accumulated ore. The work in this mine is practically unchanged since our last review. Private advices state that there is a more important body of ore below the 1450-foot level than the insiders wish known. The joint work by Best & Belcher and Gould & Curry is on the same level and direction heretofore reported in the department. Hale & Norcross is in a muddle. The mine is in control of its Grayson-Hayward contingent and the office, books, etc., down here by the Fox combination, with the lawyers making the money. The Savage official letter does not report any material change during the week. Work is being done in Potosi which indicates more active exploiting on the under levels. Work is continued on the long drawn out north drift by Bullion. It looks as if they ought to be in the Potosi ground. Last advices from Alpha were more favorable so far as regards the west crossdrift on its 500-foot level. But this has been the case about every year since they struck the fair to high grade ore about five or six years ago. In the Con. Imperial Challenge-Confidence west crossdrift has struck a flow of water. The management think they are near the west lode. In Confidence they are working from the ore consequently none was raised last week. Work is being done jointly to the west by Yellow Jacket, Crown Point and Kentuck. From Crown Point nothing new is at hand, and as for that nothing new has come to hand from Belcher, Seg. Belcher, Overman, Caledonia and Alta. Ore is still raised by Belcher and Overman, but not in sufficient quantity to pay current expenses.

Interest in the Brunswick lode is beginning

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.	Secretary.
Alta S M Co, Nev	56	5c	May 21	June 25. July 16	J E Jacobus, 309 Montgomery
Bullion M Co, Nev	50	10c	May 4	June 8. June 28	R R Grayson, 331 Pine
Challenge Con M Co, Nev	23	10c	May 13	June 16. July 8	C L McCoy, Mills Bldg
Chollar M Co, Nevada	43	15c	May 10	June 15. July 8	C E Elliott, 309 Montgomery
Gould & Curry S M Co, Nev.	81	20c	Apr 29	June 1. June 22	Alfred K Durbrow, 309 Montgomery
Jamison M Co, Cal	9	5c	Nov 27	June 23. Aug 18	Sam W Cheyney, 120 Sutter
Marguerite G M & M Co, Cal.	6	10c	Apr 12	May 24. June 21	F Mettmann, 237 Twelfth
Occidental Con M Co, Nev	37	10c	May 11	June 12. July 1	Alfred K Durbrow, 309 Montgomery
Pine Hill G & S M Co, Cal	10	5c	May 10	July 1. July 22	Chas A Hare, 1003 Railroad Ave
Rock Island G & S M Co, Nev.	14	2c	May 20	June 25. July 6	W W Guptill, 309 Montgomery
Thorpe M Co, Cal	7	2½c.	June 9	July 17. Aug 9	A F Frey, Phelan Building

WILL NEGOTIATE with owners or their duly authorized agents only.

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T. R. MILLER, Vice-Pres't. JOHN D. FLEMING, Counsel.

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to shift to the joint work in Best & Belcher on the 300-foot level, where an improvement is reported to have taken place. Mining men expect good results in Gould & Curry, Best & Belcher and Con. Virginia, but more particularly in the latter. The joint work in the above is on the same levels and direction published last week. Nothing new has come to hand from the work on the 550-foot and 650-foot levels of Occidental. In Chollar the work is confined to the same levels heretofore reported, with no essential change since our last week's issue.

The following illustrates the changes of the week:

MINES.	June 10.	June 17.
Alpha		
Alta Consolidated	$	02
Andes		14
Belcher		18
Best & Belcher	$ 51	48
Bodie		
Bullion	11	
Challenge		
Chollar	1 15	01
Confidence		
Consolidated California and Virginia	1 70	1 55
Consolidated New York		
Crown Point		
Exchequer		
Gould & Curry	35	35
Hale & Norcross	73	77
Justice		
Mexican		29
Ophir	80	74
Overman		10
Potosi	66	54
Savage		25
Sierra Nevada	52	51
Union	35	35
Utah		
Yellow Jacket	26	28

San Francisco Stock Board Sales.

SAN FRANCISCO, June 17, 1897.

9:30 A. M. SESSION.

700 Best & Belcher ... 48 150 Potosi ... 54
400 Chollar ... 01 100 Savage ... 24
100 Con Cal & Va ... 1 55 500 Sierra Nevada ... 51
600 Gould & Curry ... 35 150 Standard ... 1 40
150 Ophir ... 74 300 Yellow Jacket ... 28

SECOND SESSION—2:30 P. M.

500 Ophir ... 71 200 H. & N ... 77
200 Mexican ... 29 100 Belcher ... 18
200 Gould & Curry ... 33 700 Sierra Nevada ... 46
300 Best & Belcher ... 47 250 Union ... 35
200 Savage ... 25 200 Alta ... 02
100 Con Cal & Va ... 1 55 300 Andes ... 14
500 Chollar ... 00 100 Overman ... 10
1000 Potosi ... 50

Rainfall and Temperature.

The following data for the week ending 5 A. M., June 16, 1897, are from official sources, and are furnished by the U. S. Weather Bureau for the MINING AND SCIENTIFIC PRESS:

CALIFORNIA STATIONS.	Total Rainfall for the Week.	Total Seasonal Rainfall to Date.	Total Seasonal Rainfall Last Year to Same Date.	Average Seasonal Rainfall to Date.	Minimum Temperature for the Week.	Maximum Temperature for the Week.
Eureka	.70	50.44	51.90	45.82	42	70
Red Bluff	.76	24.92	22.43	25.79	50	96
Sacramento	T	17.28	23.23	24.85	52	94
San Francisco	.03	23.25	21.25	23.06	50	67
Fresno	T	10.53	8.18	7.46	50	100
San Luis Obispo	.00	20.74	17.72	....	46	94
Los Angeles	.00	16.85	9.35	19.79	50	80
San Diego	T	11.77	5.92	10.53	54	70
Yuma	.00	5.35	0.88	2.98	56	102

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Assessment Notices.

JAMISON MINING COMPANY.—Location of principal place of business, San Francisco, California. Location of works, on Jamison Creek, near Johnsville, Plumas County, California.

Notice is hereby given that at a meeting of the Board of Directors, held on the 27th day of November, 1896, an assessment (No. 9) of 5 cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the Secretary, at the office of the company, 120 Sutter street, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 25th day of January, 1897, will be delinquent, and advertised for sale at public auction; and unless payment is made before, will be sold on MONDAY, the 22nd day of March, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

SAM W. CHEYNEY, Secretary.

Office Room 50, 120 Sutter street, San Francisco, California.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 25th day of January, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on the 24th day of February, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 21st day of April, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of February, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on FRIDAY, the 26th day of March, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on FRIDAY, the 21st day of May, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 26th day of March, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on SATURDAY, the 24th day of April, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on SATURDAY, the 19th day of June, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of April, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on MONDAY, the 24th day of May, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 19th day of July, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

POSTPONEMENT.

At a meeting of the Board of Directors of the Jamison Mining Company, held on the 24th day of May, 1897, it was resolved that any stock upon which the above assessment shall remain unpaid on WEDNESDAY, the 23rd day of June, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on WEDNESDAY, the 18th day of August, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

SAM W. CHEYNEY, Secretary.

THORPE MINING COMPANY.—Location of principal place of business, San Francisco, California; location of works, Fourth Crossing, Calaveras County, California.

Notice is hereby given that at a meeting of the Board of Directors held on the 9th day of June, 1897, an assessment (No. 7) of 2½ cents per share was levied upon the capital stock of the corporation, payable immediately in United States gold coin to the secretary, at the office of the company, room 44, Phelan building, San Francisco, California.

Any stock upon which this assessment shall remain unpaid on the 17th day of July, 1897, will be delinquent and advertised for sale at public auction; and, unless payment is made before, will be sold on MONDAY, the 9th day of August, 1897, to pay the delinquent assessment, together with the costs of advertising and expenses of sale.

By order of the Board of Directors.

A. F. FREY, Secretary.

Office—Room 44, Phelan building, San Francisco, California.

In the Superior Court of the City and County of San Francisco, State of California, Department No. 8. John V. Kimball, plaintiff, vs. Mabel L. Kimball, defendant. Action brought in the Superior Court, City and County of San Francisco, State of California, and the complaint filed in said City and County of San Francisco, in the office of the clerk of said Superior Court. The people of the State of California send greeting to Mabel L. Kimball, defendant. You are hereby required to appear in an action brought against you by the above-named plaintiff in the Superior Court, City and County of San Francisco, State of California, and to answer the complaint filed therein within ten days (exclusive of the day of service) after the service on you of this summons, if served within this county; or, if served elsewhere, within thirty days. The said action is brought to dissolve the bands of matrimony now existing between yourself and plaintiff, on the ground of habitual intemperance on your part for more than one year past. All of which will more fully appear in the complaint on file herein to which you are hereby referred. And you are hereby notified that if you fail to appear and answer the said complaint, as above required, the said plaintiff will apply to the said Court for the relief prayed for in the complaint. Given under my hand and seal of said Superior Court at the City and County of San Francisco, State of California, this 9th day of April, in the year of our Lord, one thousand eight hundred and ninety-seven. C. F. Curry, Clerk. By Joseph Riordan, Deputy Clerk. R. Thompson, Attorney for Plaintiff.

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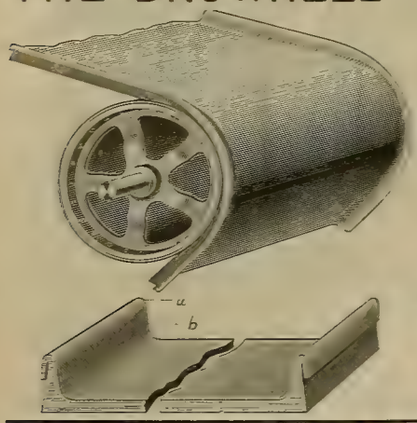
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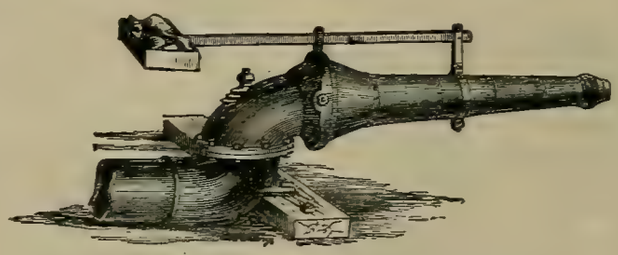
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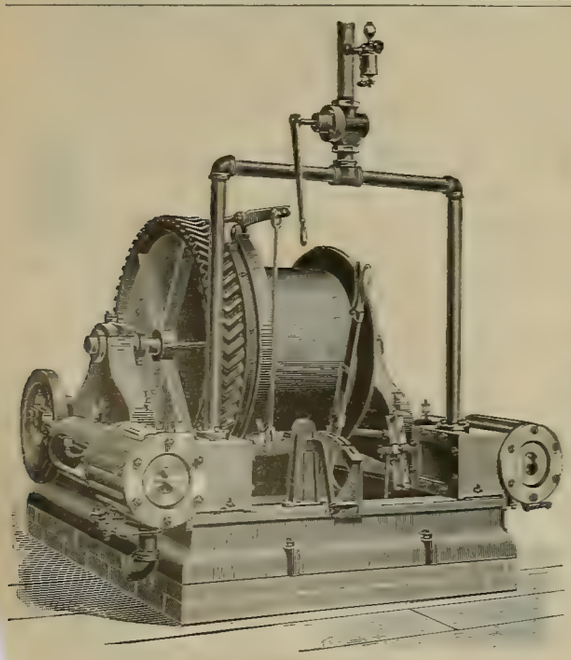
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No. 1929.—VOLUME LXXIV. Number 26. SAN FRANCISCO, SATURDAY, JUNE 26, 1897. THREE DOLLARS PER ANNUM. Single Copies, Ten Cents.

California's Water Power.

Many owners of large ditches, with water rights to thousands of miners' inches, upon the prohibition of hydraulic mining, considered these properties of little value. A few were far-seeing enough to guard their rights, in the hope that they might sometime be made use of, particularly for irrigation. None, however, foresaw what has come to pass—that no more valuable properties may be owned in California than water at points where there is demand for power generated by electricity.

The abundance of water available for generating power for nearly every part of the State, and the want of cheap coal of good quality, have caused the erection in California of the largest power transmission plants in the world. First was that to supply the City of Sacramento from Folsom dam, 22 miles in length. Then came the Bakersfield and Fresno lines—the latter transmitting power 35 miles. Now the Southern California Power Company is about to put in an electric transmission plant to carry power 80 miles, or more than twice as far as any other in existence. In time every town and village, every factory in California, will be supplied with cheap power from the torrential streams of the mountains, and with cheap power will come more factories and greater material prosperity in many directions. The upbuilding of manufacturing industries in a climate where men and machinery can do their work as well in one season as any other, will give to California an advantage over other parts of the world.



COMPRESSOR HOUSE, NORTH STAR MINE.

In the mining districts—particularly those in which there are many large plants—the water rights are already becoming of more value than they were in the palmy days of hydraulic mining. The cost of installing independent plants for each mine is being done away with by the transmission of power by electricity and the use of compressed air. This is doing much in an indirect way to foster and encourage prospecting on a large scale. There are along the Sierras many mines upon which the owners would sink shafts with power purchased as they go, and as development work would warrant, but would not take the risk of erecting independent power plants. As the demand for power increases, as it is bound to do, it will become cheaper and in time do much toward decreasing the cost per ton of mining and milling ores. The great abundance of water precludes the possibility of its being monopolized and the prices of power held up.

On this page is illustrated the compressor house of the North Star mine at Grass Valley. The water supply is obtained from the South Yuba Water Company and conveyed to the Empire Mining Company's works in a 22-inch pipe built more than ten years ago. The new conduit is a riveted steel pipe, 20 inches in diameter, joined to the lower end of the old one, under a head of 420 feet, and continues 7070 feet to the power house, where a head of 775 feet is obtained, sufficient to develop 800 to 1000 H. P. A pipe conveys the air at 90 pounds pressure from the power house to the company's shaft on Massachusetts hill, 800 feet distant and 125 feet higher, where it runs a 100 H. P. hoisting engine, a 75 H. P. pump and other pumps, blacksmith's forge, drills, etc.

West Australia's Progress.

Probably no mining district of importance has so lost the confidence of the British speculating and investing public as Western Australia, not through any fault of West Australians or of the mines themselves, but simply because the London promoters indulged more boldly and recklessly in overcapitalization in respect to mines from that colony than elsewhere. In spite of this want of confidence of the public, mining men and others directly interested have insisted that West Australian mines would soon make a good showing. In May the export of gold amounted to 59,111 ounces, valued at £224,624, and the increase has been steady and large since the first of the year.

Marking Claims Discovered by Tunnel.

In the very recent case of Campbell v. Ellet, the United States Supreme Court has held that a lode discovered by a tunnel claimant in running the tunnel need not be marked upon the surface. "Indeed," says the Court, "the conditions surrounding a vein or lode discovered in a tunnel are such as to work against the idea or necessity of a surface location. We do not mean to say that there is any impropriety in such a location, the locator marking the point of discovery on the surface at the summit of a line drawn perpendicularly from the place of discovery in the tunnel and about that point locating the lines of his claim in accordance with other provisions of the statute. It may be true, as suggested, in Morrison's Mining Rights, 8th ed., p. 182, that before a patent can he secured there must be a surface location. U. S. Rev. Stats., Sec. 2325. But the patent is not simply a grant of the vein, for, as stated in the section 'a patent for any land claimed and located for valuable deposits may be obtained in the following manner.' It must also be noticed that Sec. 2322, in respect to locators, gives them the exclusive right of possession and enjoyment of all the surface within the lines of their locations, and all veins, lodes and ledges, the tops or apexes of which are in such lines. * * * * It is enough to hold, following the plain language of the statute, that the discovery of the vein in a tunnel worked according to the provisions of the statute, gives the right to the possession of the vein to the same length as if discovered from the surface, and that a location on the surface is not essential to a continuance of that right. We do not mean to hold that such right of possession can be maintained without compliance with the provisions of the local statutes in reference to the record of the claim, or without posting in some suitable place, conveniently near to the place of discovery, a proper notice of the extent of the claim—in other words, without any practical location. For in this case notice was posted at the mouth of the tunnel, and no more suitable place can be suggested, and a proper notice was put on record in the office named in the statute," of Colorado, wherein the property was situated.

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ESTABLISHED 1860.

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TO THE PUBLIC.

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San Francisco, June 26, 1897.

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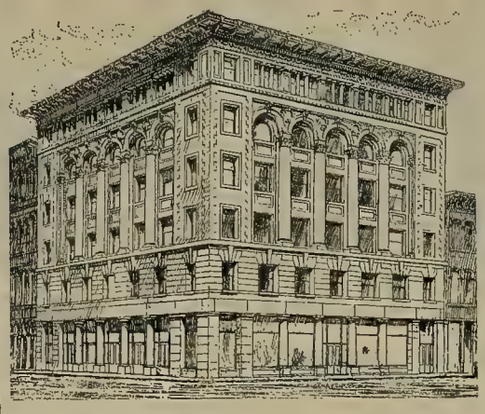
The Measure of Increased Mining Prosperity.

The increased importance to the country of mining for the precious metals, caused by the so-called "revival" of the past few years is not appreciated probably even by the miners themselves. That there has been an increased activity is shown to the public mainly by the increased output in value of the minerals. Yet this is no gauge of the growth of the business. This increase has come largely from greater activity in old mines, partly through the introduction of capital and from the many small mines which have been opened. The large mines upon which considerable development work must be done have not been heard from. This is true of nearly every district in the west. In Utah the Mercur district will, it is predicted, double the output of six months ago in less than a year from mines which have been developed at great expense, but from which no ore or very little has been taken. In Amador county, Cal., near Jackson, there are mines upon which large sums are being spent, which promise, when opened, to increase the yield of that county from 50 to 100 per cent. So, in all the older mining counties there is a similar state of affairs. Even in Nevada county, where there has never been a loss of faith in the mines, there is a certainty of increase in the old districts.

The new districts all over the West have added little to the output, and most of their yield has come from small mines. With the introduction of capital, which takes time, these will increase their yield very largely. It may be said that more money is being put into the industry than is being taken out of the mines, but most of this is for machinery or development work, which will in time return many fold.

If the mines of the Kootenays in British Columbia are not speedily developed it will not be for want of facilities furnished by capital. Railroads in process of construction or to be built will soon give low rates of freights and fares. That ample smelting facilities will soon be afforded seems beyond doubt and besides all this there is a growing desire on the part of capital in the cities of the Northwest, in eastern Canada and London to invest in British Columbia mines.

Our New Office.



This is the last issue of the MINING AND SCIENTIFIC PRESS from 220 Market Street, where it has had its home for so many years. At the head of this article is represented our new home, to which we will remove July 1st, and where even more than in the past it is designed that the office shall be headquarters for mining information, and mining men resident or visiting the city are invited at any time to make use of its facilities.

The new office of this paper is just completed, and is a modern building occupying one of the best business sites in this city. It is one block southwest of this location, being No. 330 Market street, at the intersection of Battery and Bush streets.

Our friends and patrons everywhere will kindly accept this as a general notification of change of address and will please in future see that all communications are sent to 330 Market street.

Mine Costs of the Rand.

The Mines Commission appointed by the Government of the South African Republic to examine into and report upon the condition of mining, is bringing out through the witnesses called some interesting data. It would appear generally that any large reduction in the cost of mining and milling on the Rand can not be expected without the aid and consent of the Government, particularly as to reduction of freights and the cost of dynamite. A reasonable reduction in these two items it is shown would affect an average reduction of 2 shillings, or about 50 cents per ton.

The rate of wages of the natives has been reduced so low that they are in reality little better off than slaves, their wages being fixed at from 28 to 60 cents per day. The rates of wages paid to white men are high, and lately J. B. Robinson gave notice of a reduction of 10 per cent on one of his mines that could not be made to pay at the cost of working, whereupon there was a strike. It was a question of reduction of wages or closing the mine. The percentage of white labor to the whole cost per ton of working at the Geldenhuis Deep, one of the representative large mines, is given as 35.89 per cent, while that for native labor was only 21.20 per cent. The average wages paid to white men in one of the large mines was given as about $120 per month, including superintendency, while the wages of the natives are from $7 to $16 per month.

The cost of powder was shown to be on the Princess mine about $1 per ton of ore milled, or about 13 per cent, against five cents at the Alaska-Treadwell, which is about the price in some large mines in California. This high cost comes from the dynamite monopoly. The price could be reduced, it is claimed, so that dynamite would not be more than 3 or 4 per cent of the cost of working, and still leave large profits on its manufacture.

According to the *South African Mining Journal* one witness, who is known as a friend of the Government, proved that if passenger rates were reduced 15 per cent and freight rates 30 per cent on the railways, the mining industry would save £801,900 per annum, and the Netherlands railway would still have 8 per cent in its capital.

"The Government might then call a conference of the managers of the South African railways and propose reductions on Mr. Brakhan's basis, by which the Transvaal would save £1,195,200, while the Cape would retain an interest of 6 per cent, the Orange Free State nearly 20 per cent, and Natal 8 per cent. All these are points on which the Government might easily take action at once, and earn the gratitude of the whole community."

It was shown that on a lot of Oregon pine from Delagoa bay which cost £2,679 the carriage was £14,500.

Yet in spite of all those difficulties the yield of the Rand increases rapidly each month and many new properties are developed and are beginning to produce. That the yield will increase for some time there seems little doubt and the reserves are large enough to continue it for a long time.

Alaska.

In a late issue the London *Mining Journal*, which is generally well informed as to mining in different parts of the world, there appeared an editorial on Alaska, in which it was said: "Alaska, among other remote countries on the globe's surface, is a tract of territory that may not improbably come to the fore at some future time as a gold-producing country. We published a short while ago the chief figures of the output for last year, distributed under the heads of the different contributing companies, and from this tabulated statement it might easily be gathered that the bleak and unpromising ice slopes of northwest America contain considerable auriferous potentialities. The yield for last year was just about £1,000,000 sterling—a figure that acquires additional significance from the multitudinous difficulties that have to be faced if mining operations are to be carried on continuously in a country where the thermometer sinks for long periods together to 60° or 70° below zero."

Continuing, the article goes on to describe the methods and difficulties of mining in the Yukon, inferentially implying that these apply to all mining in Alaska. Nothing is said of the comparatively mild climate along the coast of southeastern Alaska, where are the great quartz mines which have produced large sums of money for many years, before the discovery of the Yukon placers attracted prospectors, and were the cause of introducing large capital into Alaska, not a small part of which came from London. The mines at Douglas Island are well known to mining men the world over. There the climate—near the shore—is very pleasant in summer and in winter the thermometer seldom registers lower than 8 to 10 degrees below zero, Fahrenheit. An abundance of water power and timber is to be had all along the coast, and altogether the conditions there for mining are fully as favorable as in most well known districts in the world. The presence of water and timber and low rates of freight from good markets more than compensates for a little cold weather in winter.

These mines, and others along the coast, are worked the year round, water power being used in summer and steam in winter. Going north along the coast it becomes colder, until there is a limit beyond which mining cannot be conducted. So, inland, little has been done, partly owing to the cold and partly to the want of means of traveling. Yet the coast line on which quartz mining upon large scales is being conducted extends over 1000 miles beyond Douglas island. Along this coast last year there were worked over 500 stamps, and by 1898 it is expected that the mills now being worked and arranged for will increase this number to over 1000.

There is much of Alaska that the prospector will never travel over, yet there is enough country that is hospitable to make one of the most extensive mining districts in the world.

Mining Titles in Mexican Grants.

Representative Bell of Colorado has introduced a bill in Congress to provide for the location of mining claims on confirmed land grants. In some of the Mexican or Spanish grants the mineral was reserved and belongs to the Government, the grant owner only having title to the surface. This has led to considerable confusion as to how prospecters or discoverers may acquire title. The owner of the grant may exclude outsiders and prevent prospecting, but has not himself the right to work any mines.

Mr. Bell's bill provides that any one authorized to prospect on the public domain may do so also within the limits of a private grant. He is also empowered to locate a mineral claim and institute condemnation proceedings to acquire title to so much of the surface as he may require.

Concentrates.

CINNABAR has been discovered on Prince of Wales Island, Alaska.

THE $53,000,000 in the San Francisco mint is being counted this week.

IT is proposed to put in a cyanide plant at the Mammoth mine, at Bingham, Utah.

A NEW strike of copper ore has been made on Squaw creek, Shasta county, California.

SECRETARY MAHON estimates an attendance of 10,000 at the Denver Convention next month.

THE Sacramento Power Company are figuring on extending their wires to Woodland and Chico.

EXCHANGES will please change the address of this paper to our new number, 330 Market street.

A DREDGER for gold mining is to be put in the Rio Grande river, in New Mexico, this summer.

THE statement of the Anglo-Mexican for March shows production of £8963, expenses £5092, profit £3871.

THE Peck plant at Dayton, Nevada, was started up last week and is working 200 tons of tailings a day.

AT the Adelaide copper mine, at Golconda, Nevada, the concentrator will be ready for work about September 1.

THE British Columbia Exploration Company has purchased the Ottawa mine, near Trout Lake, B. C., for $20,000.

NEARLY every train from Spokane, Wash., for British Columbia, carries from 100 to 200 passengers for the mines.

NEARLY 900 new subscribers since January 1st, 1897, is pretty good, even for the MINING AND SCIENTIFIC PRESS.

IT is proposed to erect a mill with a capacity of 100 tons daily, in the Horse Shoe mining district, Park county, Colo.

AT Cripple Park, near Guffey, Colo., a cyanide plant with a capacity of 200 tons daily is to be erected to treat low-grade ores.

THE Waverly, a mine on Albert canyon, is being placed on the London market by the Canadian Gold Fields, Limited, at £100,000.

THE three miles of tunnels in the Santa Ana canyon for the Southern California Power Company are to be finished January 1, 1898.

CONSIDERABLE prospecting for gold is going on in the western part of Tehama county, Cal., on the Tehama-Trinity county divide.

THE receipts of bullion at the Denver mint for the first four months of 1897 were $6,942,877, against $4,198,021 in 1896, a gain of $2,744,854.

FIVE nuggets, valued at a total of $1330, were brought into Baker City, Oregon, by a miner last week from the Gimletville placers in Grant county.

ON the Rand group of mines, in the Rand district, Kern county, Cal., thirty-six men are working, and the output is twenty-eight tons of ore daily.

A LOT of twelve tons of ore from the Trade Dollar mine, near Boise, Idaho, sent to a smelter, netted $72,000, of which $48,000 was in gold and $24,000 in silver.

JUAN PEDRAZZINI has sold his El Carmen mine, in the Arizpe district, near Hermosillo, Mexico, for $1,500,000, while still retaining an interest in the property.

AT Bannock, Montana, the Chicago Gold Dredge Co. are working a dredge with electric power and hoist, about 1000 yards of auriferous gravel in eleven hours.

FROM Olinghouse Canyon, eight miles west of Wadsworth, Nevada, is reported an unusually rich gold find, and the usual number of men are heading for the new camp.

THE demand for silicious ores created by the copper smelters at Keswick, where they are used for flux, has opened up many properties in the vicinity of Shasta, Cal.

IN Calaveras county, Cal., Tryon & Co. have sold a French syndicate 700 acres of mineral ground near Angels Camp, including the Garnett and Ghost mines, for $333,000.

THE water jacket copper smelter at the Afterthought mine, at Cooper City, Shasta county, will start up for a season's run this week. It has a capacity of fifty tons per day.

EX-SENATOR S. W. DORSEY has organized a company in London to work his Picacho mining properties in San Diego County, California. A 100-stamp mill is to be erected.

THE Horne-Payne Company, in the Slocan district, B. C., have purchased the Bad Shot group for $100,000, the Broadview mine for $15,000, and the True Fissure for $50,000.

OF the seventy-seven acts passed by the Legislature of British Columbia at its last session, thirty-seven were connected with the development of mining in the province.

THE area of the proclaimed gold fields of Western Australia is over 300,000 square miles, and there are still unexplored districts into which prospectors have not yet penetrated.

S. F. MOORE and others have bonded to L. C. Moreland, for $5,000, a two-thirds interest in the Bay Horse and Irma gold mines in Mesquite district, San Diego county, California.

THE Comet mine at Berner's Bay, Alaska, is being developed by a tunnel to the 1000-foot level, the deepest workings in that Territory. A 40-stamp mill has lately been started up.

ILLINOIS capitalists who recently purchased the Watus mine in the Santa Maria District, Arizona, have now acquired the J. D. Thorne mine. Both properties will be developed immediately.

THE shipments for the week ending June 19 from Rossland mines were: Le Roi, 940; War Eagle, 175; Iron Mask, 100; Columbia and Kootenay, 65; Josie, 65; Cliff, 125; total, 1470 tons.

SINCE the settlement of the Indian troubles by the treaty with the Yaquis a mining boom has set in throughout the Sierra Madre mountains in the States of Chihuahua, Sonora and Durango, Mexico.

IN Mono county, Cal., according to the Bodie *Miner*, all the cyanide plants are in operation to their full capacity, and give employment to nearly 100 men. They treat about 6000 tons of tailings weekly.

THE North Bloomfield Gravel Mining Company, of Nevada county, Cal., has been allowed an appeal to the Circuit Court of Appeals from the recent decision of Judge Ross enjoining its hydraulic operations.

IN the Summit mine, at Nevada City, after a long battle with the large flow of water encountered some months ago, the management have decided to run a drain tunnel 3200 feet in length from Deer creek.

CONSUL WEISIKE, at Managua, has informed the State Department that the President of Nicaragua has issued a decree providing for the free entry into that country of all materials necessary for mining.

A DEPOSIT of bituminous coal of good quality, said to be extensive, has been discovered at Garlock in the Rand district, California. Should the coal be sufficient in quantity it will do much for the mines of the desert.

EX-GOVERNOR GRANT and E. W. Nash of the Omaha and Grant smelter, of Denver, Colo., have lately made an examination of the Pilot Bay smelter in the Slocan district, B. C., and are reported to have purchased it.

THE Kootenay Mine Owners' Association have decided to invite capitalists to consider the question of manufacturing powder in Kootenay, promising support to any one outside of the combine who should start in the business.

THE Detroit Copper Company has had a survey made for bringing water by flume from Eagle Creek to Morenci, Arizona, a distance of sixty miles. The cost would be nearly $500,000, and a final survey is now being made.

THE Alice mine, located in the Lincoln district, near Idaho Springs, Colorado, has been sold to a Chicago syndicate for $250,000. The property covers 981 acres of patented ground, and has been a producer for a number of years.

MUCH freight for Yukon and Clondyke, Alaska, is cached at Sheep creek until next winter, as the snow melted this year before it could be taken over the divide. Provisions are reported very scarce in the Yukon mining camps.

COLONEL GEORGE V. BRYAN has taken a bond on several of the best gold properties near Murray, Idaho, including the Golden Chest, Katie Burnett, Dora, Idaho, Joe Dandy and Paymaster. He represents De La Mar interests.

THE old Hanover mine, near Silver City, New Mexico, is being reopened. This mine was worked thirty years ago and 100 tons of copper was smelted in adobe furnaces by the Mexicans, but water was encountered and the mine closed.

ON the Alaska-Treadwell mines, in Douglas Island, Alaska, a shaft 8x12 will be sunk to a depth of 1000 feet. Very little is known as to the depth of the pay in those mines, and the results of this sinking will be looked for with interest.

THE new tunnel in the Tom Boy mine at Telluride, Colo., has cut the main ore body in that property 45 feet below the old workings. The upper workings have shown a continuous body of free milling ore over 2000 feet long, and 9 to 14 feet wide.

THERE are two surveying parties in the field to lay out a connection between the Great Northern road at Bonner's Ferry and the foot of Kootenay lake. The promoters propose not only to build the road and run steamships, but also work mines.

EXPERTS have been examining a group of nineteen claims at Gold Mountain, Sevier county, Utah, including the Holland group, the General Connor, the Sevier, and the Surprise group, for Eastern capitalists who have an option for their purchase.

AN unusual amount of prospecting and development work is going on this season on the coast and islands of Alaska. Most of the ledges are low grade but large. On Prince of Wales island what is claimed to be a good quality of coal has been discovered.

THE first copper refined in British Columbia came from the Hall mines furnace last week. It is proposed to ship a train load to England. As an advertisement, the Canadian Pacific Railway has arranged to run a special train from Revelstoke across the country.

NOTICE has been given in the Canadian Parliament to delay for six months the bill granting aid to the Canadian Pacific Railway for the construction of the Crow's Nest Pass line. This would delay much contemplated work in mines in the Fort Steele country.

ONE of the mills at Idaho Springs, Colo., is to experiment with compressed air in the settling of slimes, it being claimed that it would work to good advantage with hydraulic sizers, and that by such a process the finer mineral could be moved more rapidly over the tables.

IT is not often that a mine sells at a large price at auction. The Victoria copper mine, otherwise known as the Dyer, near Vernal, Utah, was sold by order of the United States Court last week and brought $65,000, James L. Gates, of Milwaukee, Wis., being the purchaser.

THE rich strike made a few weeks ago in the Mollie Gibson mine at Aspen, Colo., has proved to be but a pocket. Two shipments have been made from it, one of twenty-six tons, averaging 628 ounces to the ton, valued at $8500. The other shipment ran 2632 ounces to the ton.

THE Alaska-Treadwell Gold Mining Company of Alaska reports the clean-up for the month of May as follows: Period since last return, thirty days; bullion shipment, $40,928; ore milled, 20,383 tons; sulphurets treated, 295 tons; of bullion there came from sulphurets, $10,597.

AN unusual number of "smelter schemes" are reported. It takes so much capital, skill and ability to start and successfully run such a concern, that the chances have to be thoroughly canvassed before putting up the money, the usual result being the postponement of the enterprise.

AT the O'Neill onyx mines north of Phœnix, Arizona, lately purchased by C. N. Fowler of New Jersey, and others, in the progress of development last week a new and broader stratum of onyx of great beauty was discovered. The owners are conferring with the Santa Fe Railway for a branch road from Prescott.

ACCORDING to the Albuquerque, N. M., *Citizen*, Colorado and Eastern capitalists have closed negotiations for the purchase of a tract of land of several thousand acres in the Rio Grande valley, at Algodones, and will erect reduction works at some point along the river on the Santa Fe Railroad in the near future.

IN the early days of placer mining men naturally reasoned that the gold dust came from the mountains above. In a recent lecture before the Seattle, Wash., Mining Bureau, P. L. Trout, a mining man of large experience, in a lengthy treatise argued that such gold came "from the skies." An airship seems more needed than ever.

A DENVER company has agreed to put in a cyanide reduction works in the Chance district, in Gunnison county, Colo., treating the ores at a cost of $2 per ton, and guaranteeing to save 98 per cent of all gold and silver values, on condition that the mine owners of the district will assure them forty tons of ore per day for treatment.

THE exports of gold from the United States during May amounted to $5,466,711, against $19,106,913 for May, 1896. During the eleven months the imports exceeded the exports by about $48,271,000. The silver exports during May amounted to $4,337,342, and during the eleven months exports of silver exceeded the imports by about $46,000,000.

ON the Rand, South Africa, the rates of wages of native labor has been reduced in the mines by about thirty per cent, the new schedule issued by the Chamber of Mines, which took effect June 1, placing the rates at from one shilling and two pence to two shillings and six pence per day. This amounts to from $7 to $16 per month of twenty-six days.

ON pages 563 and 564 of this issue appears an index of some of what has been published in the 564 pages of this paper during the past six months. Those who do not regularly see the paper have little idea of the immense amount of practical information given and the large number of subjects treated in every volume of this paper. This issue closes the seventy-fourth volume.

THE receiver of the Golden Cross mines in San Diego county, Cal., has been ordered to turn them over to the defendants in the suit of the Golden Cross Mining & Milling Co. vs. James Spiers and others, who hold trust deeds to the property for the payment of $150,000 indebtedness. The property is paying from $20,000 to $30,000 a month profit and is being negotiated for by an English company.

THOUGH the annual report of the country's gold yield for 1896 by the Director of the Mint places California at the head of the list, yet many California miners hold that an injustice is done to the State in chronicling an alleged decrease from the total of 1895. The mint statistician's report, a conservative calculation, showed a large increase, and was considered to be not an exaggerated statement.

IN the Canadian parliament last week, Minister Fielding stated that the Government would take the necessary power to enable the governor-general-in-council to put in force a statute by proclamation imposing an export duty on logs, pulp wood and certain kinds of ores. It has not yet been decided exactly on what ores the Government will ask for power to put an export duty, but copper, lead and nickel are likely to be dealt with in this way.

THE Iron Mountain Company, of Montana, reports for the fiscal year that 57,970 tons of ore were mined that produced 4,376 tons of concentrates. The ore concentrates at the proportion of thirteen tons of crude rock into one ton of concentrates, a high rate permitting low grade ore to be worked to advantage. The net returns for the year were $207,626.36, and the gross returns were $308,418.61, divided as follows: Silver, 337,677.64 ounces, $210,148.23; lead, 3,833,693.96 pounds, $98,270.38.

F. B. TURNER, Manager of the Mines Exploration Company in Montana, is putting up a plant in which he will first crush the ore so that it will pass through a 10 mesh screen, then treat it in the tanks with cyanide. After leaching the ore will be pulverized to pass through a 30-mesh screen and then run over copper plates. He claims that his tests show that the cyanide process will extract about 50 per cent of the value and that 40 per cent will be saved in the plates; making a total of 90 per cent. The capacity of the plant which has been contracted for is about 40 tons in 24 hours.

NEAR Red river, New Mexico, there has been discovered an old mine worked by the Spaniards over a century ago. The ancient Spanish method of mining was in evidence from the blackened walls and irregularity of the roof, walls and floor. The method at that time was to heat the walls and roof to as great a degree as possible by building a fire against it and then dashing water upon it which caused the rock to burst, but the result was not always what was desired, which is evident from the large cavities in the formation and even in the floor which in some instances has been blown out for 4 or 5 feet in depth.

THE *Mining Investor* of Colorado Springs says that the fundamental cause for Eastern and foreign antipathy to mining stocks is apparently the light regard in which stockholders are held. This gross error appears to be prevalent among company managements of the West. Some managements bulldoze their stockholders with brazen effrontery; some politely decline to give out any information; some bluff their stockholders by telling only just so much as they want to tell; some mislead as the fancy or their pockets suit them; some try to come near doing the right thing, but mighty few succeed in giving satisfaction.

THE Treasury Department at Washington, D. C., is in receipt of a letter from the Collector of Customs at Grant Falls, Mont., submitting the question whether, in determining the respective values of lead and silver contained in imported ores, the prices of these metals in the markets of the United States at the time of importation or at the time of withdrawal for consumption shall be taken. Assistant Secretary Howell stated in reply that the prices prevailing at the time of withdrawal of such ores for consumption, or of entry for a bonded smelting and refining warehouse, are to be taken for the determination of the dutiable character of the ores.

AT a meeting of the Sacramento, Cal, Chamber of Commerce last week, the following resolution was adopted: We believe that the time has come when a speedy and amicable adjustment of the difficulties between the interests of the valley and the mountains can be had and that the two organizations representing these interests are best qualified to act in the matter. Our intercourse with some of the active supporters of both organizations warrants this conclusion. Therefore, we respectfully recommend that the Anti-Debris Association and the State Miners' Association each appoint a committee of three on conference, having in view, first, the restoration and preservation of the rivers; second, the immediate and active encouragement and development of quartz and drift and legitimate sluice mining.

THE Denver *Republican*, after stating that the director of the mint's estimate of the gold product last year credits California with $15,235,900 and Colorado with $14,911,000, says that Colorado gold producers should exert themselves to surpass California this year, and continues: "California is looked upon as the center of gold production. Its name is almost synonymous with terms indicating great wealth in gold. Colorado, on the other hand, is looked upon as distinctively a silver State. In order to achieve a reputation as a gold producer, it must not only outstrip California, but it must demonstrate that it is more than a silver producer." The yield of gold from California mines in 1896, according to the statistician of the United States Mint, was $17,181,562. It is to be hoped that the output of Colorado will exceed even this.

An Interesting Region.

Written for the MINING AND SCIENTIFIC PRESS by DAN DE QUILLE.

In the southern part of Nevada, in the lower part of Esmeralda county and in the southwestern part of Nye county, lies a section of country of great interest to the geologist, mineralogist and the mining man. This region begins on the eastern border of California and extends across the southern part of Esmeralda county into Nye county, with Silver Peak as a central point. It is a section in which there is at present a lack of transportation facilities, but it is probable that in the near future one of the several schemes for the construction of a railroad from Salt Lake to Los Angeles through that part of Nevada will be carried out. With a railroad road within reach, the mines in this southern section of Nevada would soon be developed and would probably prove to be as valuable as the De Lamar, State Line and other mines to the eastward along the line of Utah and Nevada.

Silver Peak district was visited last October by Charles D. Walcott, Director of the United States Geological Survey, who was greatly astonished to find so many promising lodes as he saw there and in neighboring camps lying idle and deserted. Mr. Walcott went into that region in order to determine whether it was desirable to enter upon the topographical mapping and geological survey thereof, and he was so impressed with what he saw that he thinks the work should be taken up at once. He was so enthusiastic in regard to the mineral features of the districts examined by him at and about Silver Peak that he gave a lecture descriptive of the region before a leading scientific society in Boston.

Silver Peak district was located as early as 1865. The town of Silver Peak is situated on the western side of a large valley that opens out to the north into a great desert near the town of Columbus. In the valley that lies in front of Silver Peak is a deposit of salt of great purity and unknown depth that covers an area of thirty square miles. On the northwestern side of this deposit is a hot salt spring, about which are found a variety of curious and beautiful crystals.

The early miners gave little attention to any mines except those producing sliver ores. In the fall of 1865 a 10-stamp mill was moved to Silver Peak from Jacobsville, Reese river, but it was such a rattletrap that by the next spring it had gone to pieces—was wrecked beyond repair.

Among the early mills was a large one built of stone by a New York company. For this mill there was brought out from the East a lot of heavy patent machinery, but it was never set up, as the company were unable to find paying ore in their mine. The leading mines of the camp were very rich, yielding ore worth from $100 to $1500 a ton. After the rich surface bonanzas were worked out the camp gradually decayed, and finally was almost wholly deserted. In 1866 over 500 locations were made in the district, but no work was done on the majority of the claims taken, on others holding work was done for a time, while a few were developed to some depth and paid well for two or three years.

Six miles north of Silver Peak is a gold belt several miles in length which was scratched over in places by the early miners; but the craze then being for silver mines, gold-bearing lodes were little valued. The lodes in the gold belt are very large; and Mr. Walcott says, taken as a mass, the ore will pay $10 to $12 a ton, with chutes and bunches much richer. He thinks this single group would yield at least $1,000,000 a year should it be properly opened and worked.

The mountains of Silver Peak district consist of slates, blue limestone and yellow magnesian limestone, with large intruded masses of gray granite and porphyry dikes. The limestone, where in contact with granite, has in many places been converted into crystalline marble. The limestones contain abundant remains of seaweeds, corals and other fossils which seem to point to a Silurian age. The veins of the district seem inclined to run in groups. In the old Pocotillo series of veins there are no fewer than thirteen seams of quartz, each from three to five feet wide. These parallel veins are separated by an equal number of beds of blackish-green porphyry. In the Vanderbilt series are two such veins and in the Sessions series five. The lodes are traceable on the surface to great distances, and everything indicates a strong and permanent formation.

In this region are seen many evidences of volcanic action. About five miles north of Silver Peak is to be found one of the most perfect craters in the State. It stands on a low bench and is about 400 feet in height. At the top it is 1500 feet in diameter and almost circular. The crater contains a cavity 250 feet in depth and the rim is perfect except at the northeast, where it is broken down to a level with the bench land. The surrounding section is covered with lava and the debris of volcanic rocks.

In Springfield district, Nye county, west of Monitor valley, is a smaller crater, which the early miners christened the "Devil's Punch Bowl." The cone is in the shape of an inverted washbowl; it stands in a valley and at the base is a quarter of a mile in diameter, with a flat top about 100 feet in diameter. The sides of this cone are smooth and regular, while in the top is a circular chasm of great depth, with vertical walls. At the bottom of the chasm is a hissing cauldron of boiling water of unknown depth. This old crater still retains great heat at a slight depth beneath its base, and is constantly foaming, bubbling and sending up columns of steam and hot gas.

There are a great number of these craters in the Great Basin region and they are nearly always found in the valleys and on low benches instead of in the peaks of the mountain ranges. They represent the closing scenes of great plutonic and volcanic disturbances in the section of country lying to the eastward of the Sierra Nevada range. There are many of them about Inyo, and in Owens valley is a line of volcanic cones almost in the center of the valley. The reason they are seen in the valleys is that they followed the upheaval of the mountain ranges which always have a central mass or core of granite or some other igneous rock. The volcanic cones come up at the point of least resistance, which was in the valleys where the sedimentary country rocks were fractured by their being elevated on either side by the upheaval of the igneous rocks of the parallel ranges. There are two or three old craters on the eastern slope of the Sierras, but all are situated upon fissures in the granite supposed to have been formed by earthquakes at the time of the volcanic disturbance that pushed up the many cones seen throughout this region.

About twelve miles south of Silver Peak is an immense deposit of pure sulphur. The sulphur is found in hills of white mud or volcanic ashes, and occurs in large veins and bunches. These sulphur hills are cut through in all directions by veins of pure alum, varying in width from mere seams to streaks several inches in thickness. In the hills are inexhaustible supplies of both sulphur and alum.

In Volcano district, partly in Esmeralda and partly in Nye, occur many beautiful petrifactions. These are generally of vegetable growths and among them are found large trees. The predominant rocks are limestones, and these are full of fossil remains of various kinds. In Volcano district is a great copper belt. In the belt are no fewer than thirty distinct lodes. All these lodes carry from $5 to $50 or $80 in gold and silver, as well as a high per cent of copper.

In San Antonia district, in Nye county, at the south end of Smoky valley, is a formation of slate and porphyry. In the slate were found at the surface rich veins of chloride of silver. The deepest work done was from 100 to 200 feet. Most of the mines were abandoned as soon as the surface bonanzas were worked out, or when the ores paid less than $100 a ton—$100 a ton being the charge for reduction. On a mountain in this district are found a great abundance of geodes filled with quartz crystals of various colors and chalcedony in beautiful forms. This district is about sixty miles east of Silver Peak, with no water between points; to the southward of the San Antonia mountains all is an unbroken valley that extends down into the great Amargoso desert. About the mines are several big springs, but wood is very scarce.

Just east of San Antonia lies the Ralston valley, the scene of the death of Judge J. H. Ralston, who wandered away from Austin in the winter of 1864, and ended his life alone on the desert. A monument of rough stones marks the spot where his body was found.

Alida valley joins Silver Peak on the southeast and its mines have been worked more or less in a small way ever since their discovery in 1871. The country rock is limestone, with dikes of porphyry. The lodes of the district carry both silver and gold, the latter predominating in several of the leading mines. The mineral belt is seven miles wide by sixteen in length.

Tule Canyon district is situated about ten miles from Alida. It contains large and rich placer mines that have been worked off and on for many years. Nuggets of gold worth from $50 to $100 are occasionally found. The placers cover an area of about ten miles square. Water is scarce. The only water in the district comes from a few small springs. In places which cannot be reached with water the miners dig up the gravel with their picks and pick out by hand such pieces of gold as they happen to see. With a good supply of water these placers would pay immensely. Above the placers some rich gold lodes have been found. The prevailing formation is limestone and granite.

Twenty miles south of Alida valley lies Gold Mountain district. The lodes are from 5 to 20 feet in width and all gold-bearing. The district is a network of veins. Some very rich surface bonanzas were found by the first miners. The lodes are inclined to be pockety, a condition in them that discouraged the early miners. On the croppings of the Oriental lode was found a big boulder that assayed at the rate of $64,000 a ton. It was all alive with gold. When it was broken up, several thousand dollars worth of it was carried away as specimens. When first found this was thought to be the lost Breyfogle mine.

Red Mountain district joins Silver Peak on the north. This is a gold belt eight miles long and four miles wide. The silver belt in Silver Peak is parallel with it and about the same length. Red Mountain is full of gold-bearing lodes. The main lode is the Gold Mountain, which is from 6 to 30 feet wide, and crops out for miles. In one place it forms the face of a precipice for a distance of 600 feet and stands bare to a depth of over 800 feet. Gold is found in it in large, irregular grains and sheets, but is principally fine. Many tests show the vein to average $15 to $25 in fine gold. Parallel to this lode to a distance of five miles in width are many similar lodes from 2 to 5 feet in width. Little work has been done in the district in the last ten years.

Palmetto district is still farther north of Silver Peak. It contains many lodes carrying gold, silver and copper. At the head of Palmetto valley are the Palmetto placer mines. These placers were discovered in May, 1869, by a Spaniard. The only water is in a few small springs. The gold is coarse, but is worth only $13.60 an ounce, owing to the copper it contains. The placers are very extensive, reaching almost to Alida valley.

In this region is found an abundant growth of a species of arborescent aloe. In the head of the young shoots of this aloe grows a bulbous mass about the size of a hen's egg, which the Indians use as food, cooking it in various ways. The raw bulb cuts like a potato, and has a slightly bitter taste. When roasted in hot embers this bulb is quite palatable. It is well for the prospector to know that this peculiar fruit will not only sustain life, but is also as wholesome as the potato. In marshy places were found an abundance of "grass nuts." They grow on the roots of a kind of a reed grass, and are about the size and shape of filberts. They may be either boiled or roasted, when they taste like the sweet potato.

To southward, down toward Death valley, indications of terrific volcanic outbursts multiply on every hand, and in some places appear to be comparatively recent, as gravel beds are seen that are capped with flows of basalt. Some of the gravel beds are hundreds of feet in depth. In places they are tilted at all angles with the shales, sandstone and conglomerate, in many instances standing in a vertical position. The conglomerates appear to be of great age. Through them often run veins of compact limestone, while in other places they are lava-capped. Some of the hills are built up of strata of white, red, yellow, blue, brown and black volcanic material—almost every color is seen except green. The whole country seems once to have been a sea of volcanic fires covering thousands of square miles.

Silver Peak is the center of a section of country in which sooner or later some wonderfully rich mines will be developed. In places here and there the region wsa surface-gouged in the early days when only the richest ores would pay for handling. Ores that did not pay over $100 per ton could not be touched; for shipping it was necessary to so assort the ore that it would not be worth less than from $300 to $500 a ton. The little mills erected in the new camps charged $100 a ton for working ore, and then did not save more than two-thirds of the contained precious metals. Ores containing all kinds of base metals were worked by the process in use for the free milling ores of the Comstock—"It is the only way to work silver ores," said the millman. When the first bonanzas were worked out and assessments were called for, stockholders refused to respond. Then wild speculation finally culminated in a big smash on the Comstock in 1864. In the panic nobody would put up money on prospects. It was bad on the Comstock, but in the new camps out in the wilds it was ruinous—it shut down everything in far away outside regions.

For years little has been done in any of the old camps until recently. Now a start has been made at De Lamar and other places in the eastern part of the State, and we may expect soon to see a rush to the region the wonders of which have been briefly touched upon in this article. With up-to-date machinery and improved ore working processes this central section of Nevada would soon be as famous as Cripple Creek or any other mining region on the Pacific Coast.

THE production of platinum in Russia continues to be almost entirely from the placers of the Oural. The production increased steadily until 1894, but in 1895 there was a considerable decrease. For 1896 the output is estimated at 4800 kegs. It is believed that real production is above that reported, the miners themselves stealing a part, while another part is concealed to avoid the payment of tax. Some authorities estimate that 25 per cent, at least, should be added to the official statement. This would make the total 5500 kegs in 1895 and 6000 kegs in 1896. The crude platinum obtained is not refined in Russia, as a rule, most of it being sent to Germany for that purpose. Iridium is found in connection with the platinum. The quantity obtained in 1895 was 4100 kegs, and for 1896 it is estimated that a total of 4250 kegs was produced.

THE dust collected from the smoke of some Liege furnaces, burning coal raised from the neighboring mines, produces, when dissolved in hydrochloric acid, a solution from which considerable quantities of arsenic and several other metallic salts may be precipitated.

Mr. Burger's Article on Treating Pyritic Gold Ores.

The following correspondence is self-explanatory:

TO THE EDITOR:—My attention has been called to the article, in your issue of April 3, 1897, on the Practical Treatment of Pyritic Gold Ores at Gibbonsville, Idaho, by C. C. Burger. I am glad to know that it is so successful, but regret that he does not give due credit to A. Thies, Esq., the originator of the method, and from whom Mr. Burger got the whole idea of treatment when visiting the Haile mine, in South Carolina, where Mr. Thies has had a large plant in successful operation for over eight years, and the same kind of plants are working at several other points from Nova Scotia to Mexico.

The Gibbonsville plant follows the same routine as at the Haile mine, except the use of a Pierce turret furnace for the first roast and filters working under pressure, the latter a doubtful improvement from an economical standpoint. In 1895 Mr. Burger obtained from the Mecklenburg Iron Works, Charlotte, N. C., full working drawings of the plants as erected under Mr. Thies' direction, and afterwards was furnished with data for the practical working.

Such being facts, the claim made in the article of the plant at Gibbonsville being "designed and operated by Mr. McDonald and the writer," C. C. B., seems strange, as the credit should be given to the one who originated, and, after many years of work, brought to success the method, viz., A. Thies. JOHN WILKES.

Charlotte, N. C., May 27, '97.

TO THE EDITOR:—In answer to Mr. Wilkes' letter, I would say that it is true that I obtained full working drawings, details, etc., of chlorination plants built by the Mecklenburg Iron Works under the direction of Mr. Thies. Similar figures and information were obtained from other machinery firms. My purpose in getting such facts from Mr. Wilkes was thoroughly honest and usual, my intention being to lay them before the company and urge their acceptance. The conditions prevailing at Gibbonsville rendered this impossible, it being necessary to install the chlorination plant in a building already on the ground, requiring a much greater concentration of plant than offered by Mr. Wilkes. The proposal of the Mecklenburg Iron Works comprised five one-ton barrels and fifteen sand filters, each 6x8 feet. The same work was accomplished by two 1½-ton barrels and two pressure filters. The machinery was procured from the Gates Iron Works of Chicago, and not one iota of the information supplied by Mr. Wilkes was made use of.

In the actual working of the plants there are only two points of similarity—the chlorinating barrel and sulphate of iron precipitation. I believe Mr. Thies claims the credit of having developed the modern barrel from the old Mears barrel. However that may be, R. P. Rothwell did this, independently of Mr. Thies altogether, at Deloro, Canada, in the early 80's, subsequently improved by John E. Rothwell, resulting in barrel chlorination as it is carried on today in South Dakota and Colorado.

The details of precipitation were modeled after the writer's knowledge of California practice. Mr. Thies derived his information from the same source. Other important adjuncts of modern chlorination, such as mechanical roasting, pressure filtration, etc., used at Gibbonsville, Mr. Wilkes rejects as "not economical."

Taking all these facts into consideration, it seems to me to be the very height of presumption to say that the credit for our success in treating Gibbonsville ores should be given to Mr. Thies.

It was not claimed that any great discovery was made in the plant. It was claimed that it was an improvement over existing methods of chlorinating concentrates. The cost per ton at Gibbonsville is almost the same as at Mr. Thies' plant at the Haile gold mine, South Carolina, yet at Gibbonsville we were a hundred miles from a railroad, and labor and all supplies, fuel, etc., cost us from three to four times as much as they would in South Carolina.

I consider Mr. Thies' method of working, comprising old-fashioned hand-rubbled reverberatory furnaces and gravity sand filtration, as slow, expensive treatment, and altogether out of date. A Thies plant would make a very poor showing alongside one of the modern chlorination works now operating in Colorado.

Mr. Wilkes' statement that pressure filtration is "a doubtful expedient from an economic standpoint" goes hand in hand with Mr. Thies' statement in the *Engineering and Mining Journal*, some time ago, that chlorinating barrels of over one to two tons capacity were only successful in one or two places in the Black Hills. These expressions are highly ludicrous to those of us engaged in chlorination in the West, who know that five-ton barrels and pressure filtration are used in plants at Gillett, Florence, Colorado City and Boulder, Colorado. The capacity of these plants, together with those in the Black Hills, will soon reach 800 tons daily. Such results would be impossible without the two above essential features.

In conclusion, I would state that the only omission as regards the "credit" of the success of the Gibbonsville plant was that more stress should have been laid on the leading part taken in the work by Mr. Bernard MacDonald, then president and manager of the company, to whom is due, more than to myself, the success of the plant, and at whose request the article was written. C. C. BURGER.

Boulder, Col., June 8, '97.

From Mine to Mint.

NUMBER V—CONCLUDED.

By D. K. TUTTLE, Ph. D., Melter and Refiner of the United States Mint at Philadelphia.

From what has been said about segregation it will be readily understood that a silver ingot is not uniform in composition. In a cross section the center of such an ingot is appreciably richer in silver than the outside surface, which first chilled in contact with the iron mold. The ingot, being a flat bar, is rolled out by the coiner into long strips the thickness of the future coin. The rich center of the bar has now become the rich central line of a long, thin strip, and disks or planchets punched from such a strip will necessary be richer in silver than the scrap.

It will now be easily seen that if the melter and refiner furnished to the coiner silver ingots of 0.900 average fineness, the planchets cut therefrom would make coin above standard.

It has been found by long experience that the silver ingot which will produce standard coin should not assay above 0.899 in silver.

All calculations for amount of copper required in making up silver melts have 0.899 as the final result desired. The problem is still further complicated by the fact that about one-half of the weight of ingots sent to the coiner comes back as clippings and of lower fineness than the average. These clippings are added to each melt of fresh bars when available, and their lower fineness must be allowed for in calculating the alloy required for the bars.

When two rows of planchets are cut from strips, as is the case in quarter dollar and dime coinage, the central line is left intact, and the clips are, therefore, richer than dollar and half dollar clips, from which but one row of planchets have been cut. It thus appears that not only the quantity but the kind of clippings added to the bar melt modify the quantity of alloy to be added.

No two silver bars have the same weight, and they usually differ a few thousandths in fineness, so that the alloy must be calculated for each individual melt. With ten furnaces in operation on ingots, making five or six melts each per day, it will be seen that the calculations required involve much labor, and an interesting chapter might be written on the short-cut methods of wonderful accuracy which the ingenious computer is driven to invent by the constant iteration of similar yet never identical calculations.

Such are some of the perplexities arising from "segregation" in silver copper alloys.

The manufacture of gold ingots is much less troublesome to the computer. The same crucible which has a holding capacity of say 3300 ounces of standard silver will serve for a gold melt of 6000 to 6500 ounces (400 to 430 pounds avoirdupois).

The fineness of gold bars is furnished to the melter and refiner by the assayer to the tenth of one-thousandth.

Bars, preferably of identical fineness, are weighed off in proper quantity for a melt, and placed on a hand truck with a melt number tagged to each little pile of bars. A sufficient number of such are prepared for a day's melting. A chest of drawers mounted on truck carries suitable sized boxes, each having a permanent number plainly marked on it.

The copper requisite for melt Nos. 1, 2, 3, etc., is placed in boxes 1, 2, 3, etc., and the trucks with bars and the one carrying the boxes of alloy meet in the melting room, where the distribution is made, a single melt at a time—bars and alloy—to each furnace.

A strict record is kept and the melting room is charged with weight of all metals sent into it in the morning. At the close of work for the day and before the workmen are dismissed all returns from the room, whether ingots, tops, filings, etc., are weighed, when any shortage, real or apparent, will be noted. Of course, the returns never exactly equal the charge sent out, since some little metal will adhere to the crucibles and some will be found in the ashes. This is afterwards recovered as "sweeps." But for the time being these shortages are unknown quantities. Experience, however, has shown what may be expected to pass into the sweeps, and an allowance is made in comparing the charge and returns from the day's work.

"*Sweeps.*"—This is a very broad general term in mint practice, and includes every kind of waste known to contain, or likely to contain, gold or silver, except actual sweepings. The floor of the melting room is swept each day, but the gatherings from the broom are carefully mingled with a suitable flux and thrown into one of the crucibles, still hot and surrounded by the fire left from the day's work. A crucible is selected which has seen such service as to entitle it to retirement from age. On the following morning the contents of the crucible will be found to have "sweated" down, the flux to have fused into a glass, and a lump of metal or "king" will be found at the bottom on breaking the crucible. This king is weighed, credited to the melting room, sent to and charged to the refinery.

The actual "sweeps" consist of broken crucibles and dipping cups, all ashes from the fires, burnt gloves, aprons, sawdust, and packages in which bullion has been sent to the mint, settlings in catch wells and in roof gutters; in short, everything which may contain bullion without its being visible to the eye.

All material of this kind is sent to the sweep cellar, and such as needs crushing is passed under heavy cast iron rollers mounted in a mill similar in principle to the Chilian. The advantage of the roller crushing is that, while brittle materials are reduced to a coarse powder, any pellets of metal will be flattened out and caught in the sifting operation which follows.

These metallic scales are melted down and find their way to the refinery. What passes through the sieves still has value, and, if the product of silver working, it is sampled, assayed, barreled, and sold to smelting works.

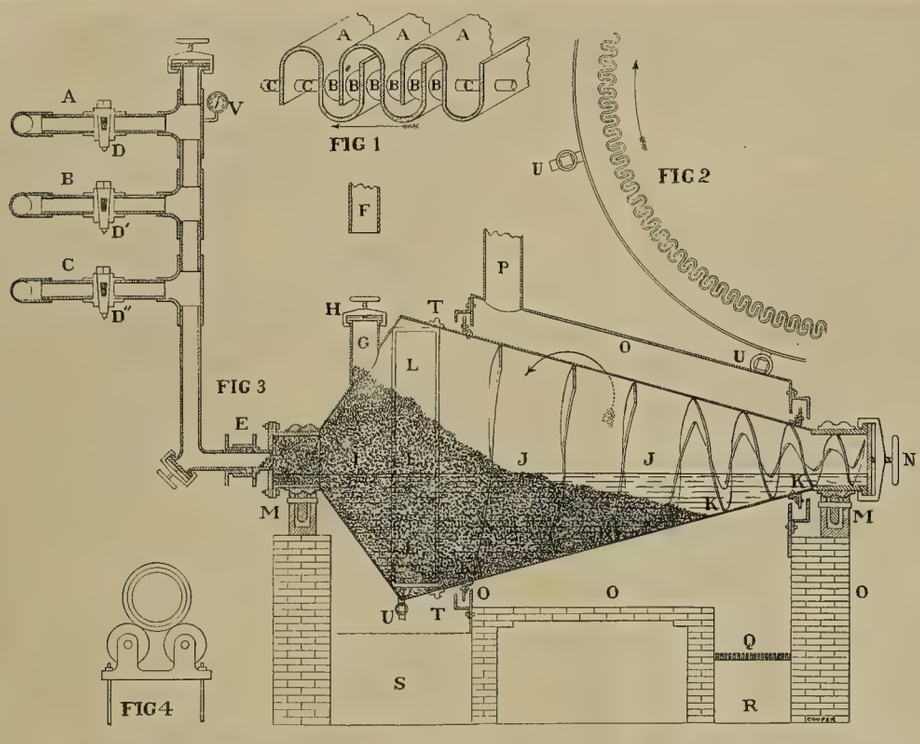
If the powdered material is from furnaces in which gold has been worked, it is passed through an amalgamator into settling tanks. The mud from these is dried, sampled, assayed and sold.

The melter and refiner receives a credit in his bullion account for the amount of gold and silver shown by assay to be contained in the sweeps sold. Sales are made on competitive bids, and the returns from this source at the Philadelphia mint are from $18,000 to $20,000 per annum from sweeps produced in the melting department alone.

Mining Location Boundaries.

TO THE EDITOR:—With reference to mining locations, in one of your leaders of last week's issue, permit me to give you my method of locating on mineral-bearing veins, which seems to me the only rational way and one that must be indisputably correct, and if generally adopted would save any and all future litigations and subsequent disputes. Having found a prospect and the formation being satisfactory, the vein showing a true fissure characteristic with dyke or one wall (I am very partial to eruptive formations), I proceed to mark off my quartz claim approximately correct by rough measurement and in accordance to the mining laws and the requirements of Chapter 6, Title 32 of the Revised Statutes of the United States and the local customs, laws and regulations. I start in to more fully prospect vein and test for values—for free gold samples—with mortar and horn; if sulphurets, determine value by assay, finding also percentage. When I am satisfied my prospects indicate that a chute is present, from my explorations and long mining experience, I get a deputy mineral surveyor and have the said claim correctly surveyed and tied to some Government corner of section line with an exact bearing to some natural object or witness tree, or to the line of some patented mine. Then a map is made, the same sketched and transferred to and into the books of County Recorder kept for that purpose, the map being attached to my notice of location on a reduced scale, being a part thereof, the paper notices being so easily destroyed by wind or rain. I place on the mine a painted notice on tin or zinc, stating name of mine, area, volume and page of county records, and name of locator, so that the passing prospector can see who owns the land; if he wishes to search the records, he has the information to do so. The map on the record book will clearly show him the boundaries, distances and bearings, all being placed thereon. If the original paper notices had been allowed to remain, for even a short space of time, the writing would have become invisible and unintelligible; but by the tin painted sign, securely nailed to a tree or strong post at each end of the claim, would be as nearly permanent as can be devised. The side monuments, being 300 feet from each side of center line, can, if destroyed, be easily found by measurement. I have adopted this plan and precaution and find it works well, and security is accomplished with very little trouble or expense. When a patent is needed the surveyor has all his field notes; the owner is then ready to apply for his patent with little delay. If the new law had been thus formulated, many of the objectionable features would be removed; the $100 of work done during current year; the survey made compulsory; the extra $50 of expenditure, as now ordered, could be done away with; continuous work and development would probably have resulted, as few men would allow such a piece of property to remain unworked. The survey being prima facie evidence that the owner proposed to continue developing, hence no claim would be valid without survey and the proper recording of said plat, should be the law. Then one recording would suffice, which would be positive and absolute. Three months should be allowed a prospector to define the values of his vein; this time should be sufficient to arrive at fair conclusions that his claim is worth his holding and securing properly by this method, or abandon it altogether. W. FRANK DRAKE, E. M.

Sonora, Cal.



A. S. COOPER'S APPARATUS FOR EXTRACTING GOLD AND SILVER ORES BY THE CYANIDE PROCESS.

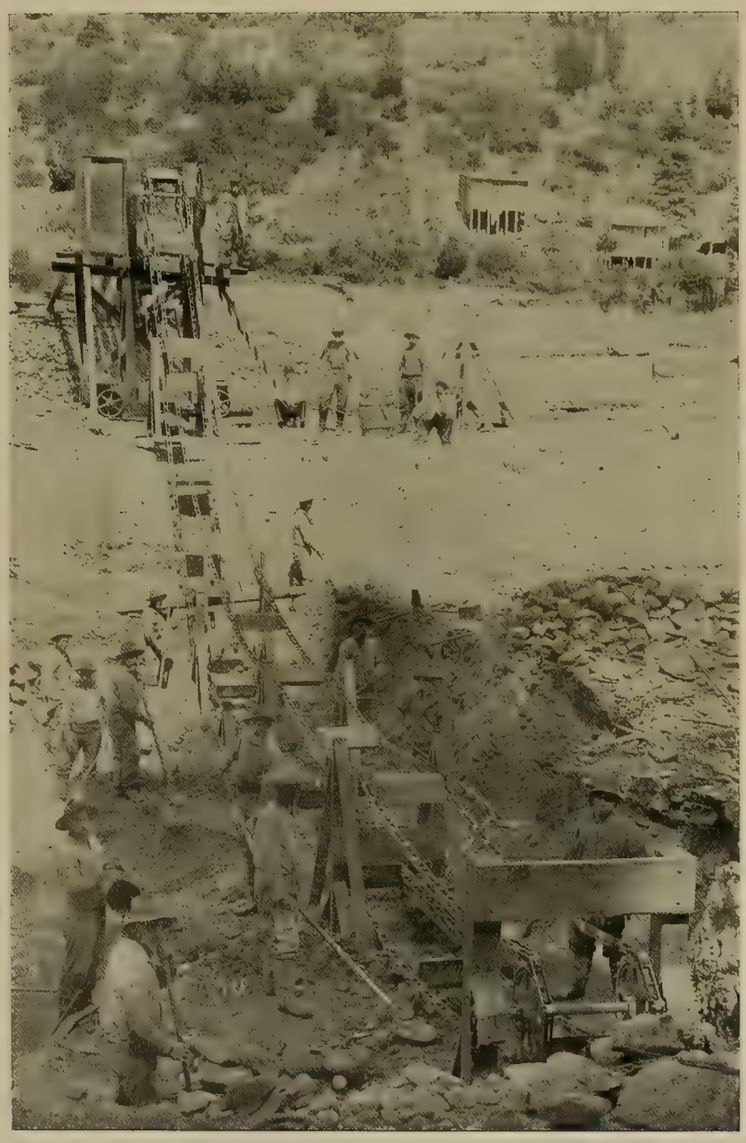
A Gravel Talings Lift.

For working gravel more new and novel devices have been introduced, probably, than for any other branch of mining. There is illustrated on this page a device put up at the Alturas mine, in Plumas county, made necessary by the want of grade for dump. The bed of Slate creek is worked, and the richness of the gravel enables the owners to work at an expense per yard that could not be borne by the usual gravel banks.

British Investors.

The London *Advertiser* says of American mine investments: "Considerable interest has been taken of late in American mines, and this interest has been increased by articles which have recently appeared in the *Statist* and elsewhere, as well as by the fact that the Exploration Company (with which Messrs. Rothschild are largely identified) bas purchased one-quarter of the stock of the Anaconda Company of Butte, U. S. A., at a cost of $7,500,000, besides a controlling interest in the Helena & Frisco Mining Company of Idaho, the Tom Boy of Telluride, Colo., and others. But it has been noticed that these shrewd financiers have not found it advisable to reincorporate these companies under British law, preferring instead to re-register under the laws of the United States. Other prominent investors have followed their example, believing that gold mining is the only business that is unaffected by panics and international disturbances, gold being the one product that never has to seek a market."

THE California Asphalt Company in Ventura county, California, is expending about $100,000 on its plant there. The asphalt will be shipped East via the ocean route to San Pedro, thence over the Santa Fe railroad.



TAILINGS WORKS OF THE ALTURAS MINE.

Apparatus for Extracting Gold and Silver From Ores by the Cyanide Process.

Invented by A. S. Cooper, California State Mineralogist.

Cyanidation.—Gold and silver are soluble in an aqueous solution of cyanide of potassium when oxygen is present. This reaction is expressed in Elsner's equation:

$$2Au(\text{or } 2Ag)+4KCy+O+H_2O=2AuKCy_2$$
$$(\text{or } 2AgKCy_2)+2KOH.$$

Washing and Neutralizing.—Frequently ores contain oxidized pyrites, acid earths or other objectionable ingredients, which are destructive to the cyanide. Some of these are soluble in water and should be removed by washing, or be neutralized by a caustic alkali or alkaline earth and then washed. The employment of hot water for this purpose would be more efficient than that of cold water.

Temperature.—The activity of oxygen and of the cyanide of potassium is increased greatly by increase of temperature, consequently the solubility of gold in cyanide of potassium is effected by temperature. Exactly what temperature is most effective and economical has not been determined. The gold is dissolved at a considerable rate at a temperature of 80° to 120° Fahr. But, unfortunately, the solubility of oxygen in water is greatly decreased by temperature. At 122° Fahr. the amount dissolved is about one-half of the amount dissolved at 86° Fahr.

Oxygen.—Gold leaf placed on the surface of a cyanide solution will dissolve in a few minutes, and the stronger the solution the quicker it will dissolve. This is in consequence of the oxygen present on the surface. But if the gold leaf is immersed in the solution it dissolves but slowly, the strength of the solution affecting its rate of dissolution slightly. The slowness of the action is owing to the absence of oxygen beneath the surface. By the action of this agitator or mixer each and every part of the ore is brought above the surface of the solution and into the compressed oxygen, and then slowly sinks below the surface. This action can be frequently repeated. Oxygen also becomes entangled in the interspaces of the ore when it is brought above the surface, and then when it sinks below the surface the ore carries the oxygen into the solution, thoroughly oxygenating the solution.

The dissolution of the metals in a solution of cyanide of potassium is in consequence of the action of oxygen which may be absorbed from the air or artificially supplied. Oxygen occurs mechanically mixed with nitrogen in the atmosphere, of which it forms about 21° by volume and more than 23° by weight.

The more cyanide a solution contains the less oxygen or air it will absorb.

Agitation.—Mechanical agitation expedites solution and lessens the time of extraction by quickly diffusing the saturated solution, which immediately surrounds the solvend while it is being dissolved. It assists the water in absorbing the oxygen which is necessary in the chemical reactions attending the cyanide process.

Filtration.—When the extraction is completed the solution of cyanide and gold is separated from the ore by drainage. To be worked successfully, different ores, even ores of the same class, require different treatment as to washing, neutralizing injurious substances, degrees of temperature, amount of cyanide of potassium and oxygen present, and length of time agitated. An apparatus that will effect these mechanical and chemical operations quickly and economically is to be greatly desired. The following described apparatus fills, to a certain extent, the requirements stated above:

Description and Details of Apparatus.—All those parts of the apparatus with which the cyanide soution comes in contact are made of steel. The apparatus consists of a rotary drum formed of two oppositely projecting cones with coextensive bases and sides of unequal angles. The longer cone *JJ* (Fig. 3) forms the body of the drum. The shortened cone *I* is arranged so that the line of its lowermost edge will be almost at right angles to the lowermost edge of the longer cone. A spiral blade *KKK* is located within the longer cone, which, when the drum is turned in the direction shown by the arrow, will force the material toward the shorter cone. The disposition of the shorter cone is such that it performs the work of giving the material forced against it by the spiral blade a tendency to gravitate towards the small end of the longer cone. When the drum is turned in a contrary direction to that indicated by the arrow the material is carried towards the small end of the longer cone, and when the cover *N* is removed the material is discharged. The spent material can be discharged into and carried away by a launder or car. In order to reduce friction the drum revolves on the wheels *MM*, a side view of the same being shown in Fig. 4. A sprocket wheel surrounds the drum at *J*. This is run by suitable power and mechanism so that the drum can be run at the required speed and the direction of its rotation changed at will. The drum is encased in an iron and brick covering *OOOO* into which areopenings to the firebox *A* and ashpit *R* and smokestack *P*. By this arrangement the cyanide solution can be brought up

to the required temperature. When the cover *H* is removed the ore is fed into the drum through the opening *G* from the ore chute *F*. The pipes *A*, *B* and *C* are stationary and are connected with the drum by the stuffing-box *E*. The stuffing-box permits the pipes to remain still while the drum is rotated. Neutralizing solutions and water for washing are conveyed by the pipe *C*, their flow being regulated by the cock *D*''. The cynanide solution is conveyed by the pipe *B*, its flow being controlled be the cock *D*'. Pipes *C* and *B* are connected with suitable tanks. Atmospheric air or other gases are carried by the pipe *A*, which is connected with a suitable compressor or generator. Their supply to the drum is controlled by the cock *D*, and their pressure is indicated by the gauge *V*. Neutralizing, wash and cyanide solutions can be removed to a sufficient extent from the ore by the filter shown in Figs. 1, 2 and 3. Plates of steel (*AAA*, Fig. 1) are bent in the form of the letter *S*, and these are connected together by steel wire *C* and washers *BBBB*. Several wires are put through the plates at the required distances. By this form of construction fluids are permitted to go through the filter, but the solids are arrested by their gravity; especially is this true when the filter is turned in the direction indicated by the arrows.

The lowermost cock of the cocks *UU* is opened and the liquid is carried by gravity through it to waste or received in the sump *S*. Filtration can be accelerated by introducing compressed air from the pipe *A* into the drum and upon the surface of the liquid. A small amount of ore usually escapes through this filter. This can be caught in settling tanks or otherwise and returned to the ore bins or to waste.

This apparatus will wash, neutralize, heat, oxidize, agitate and partly filter ores and solutions in the cyanide process. The ores and solutions are also cheaply and easily handled. Less power is required to operate this mixer than those containing paddles.

By the use of pumps, pipes and tanks these mixers can be placed in battery of two or more and solutions conveyed from one to the other through the pipes *A*, *B* and *C*, using solutions of different strengths and several times.

UNDER the new Canadian tariff all mining machinery, provided that the same kind is not manufactured in Canada, may enter free. The Kootenay Mine Owners' Association contend that the mining machinery manufactured in eastern Canada is usually of a poorer class than that made in the United States, and it is proposed that a resolution should be passed asking the Government at the next session to put mining machinery on the free list if the Canadian manufacturers did not in the mean time raise the quality of their machines to the equal of those made in the United States.

THE value of the yield of the mines of the Kootenay country, B. C., in ore and matte exported from January 1 to June 19 of this year is returned at $3,374,906.

Japanese Agriculture.

The two illustrations on this page show two very diverse phases of Japanese agriculture. One illustrates the small-scale irrigations which are widely practiced, in which the farmer acts as his own motor for pumping by rigging up a treadmill by which he throws out a small stream from a mud-hole on a river margin to the the low land adjacent on which he has his crop. If this Japanese had a better conception of the utility of domestic animals he could save himself from this everlasting climbing, for a good, heavy dog could do the work if he were properly rigged for it, while the farm owner discussed the Hawaiian question with the lonely lady on the bank. Proper appreciation of mechanical helps would also save the man's time for other pursuits, for probably a rude windmill or a current wheel would be raising water while he slept. But the Japanese will not long be tramping up imaginary hills on treadmills, as they are fast learning progressive arts. We cannot, however, refrain from a single appreciative word for this benighted pumper. It is manly to do the work himself instead of setting his women folks at it, as barbarians would do, and at the same time it is a mark of his intelligent insight that he keeps the gad in his own hand instead of passing it over to the divinity on the bank. The Japanese seems disposed to trust the new woman thus far and no farther.



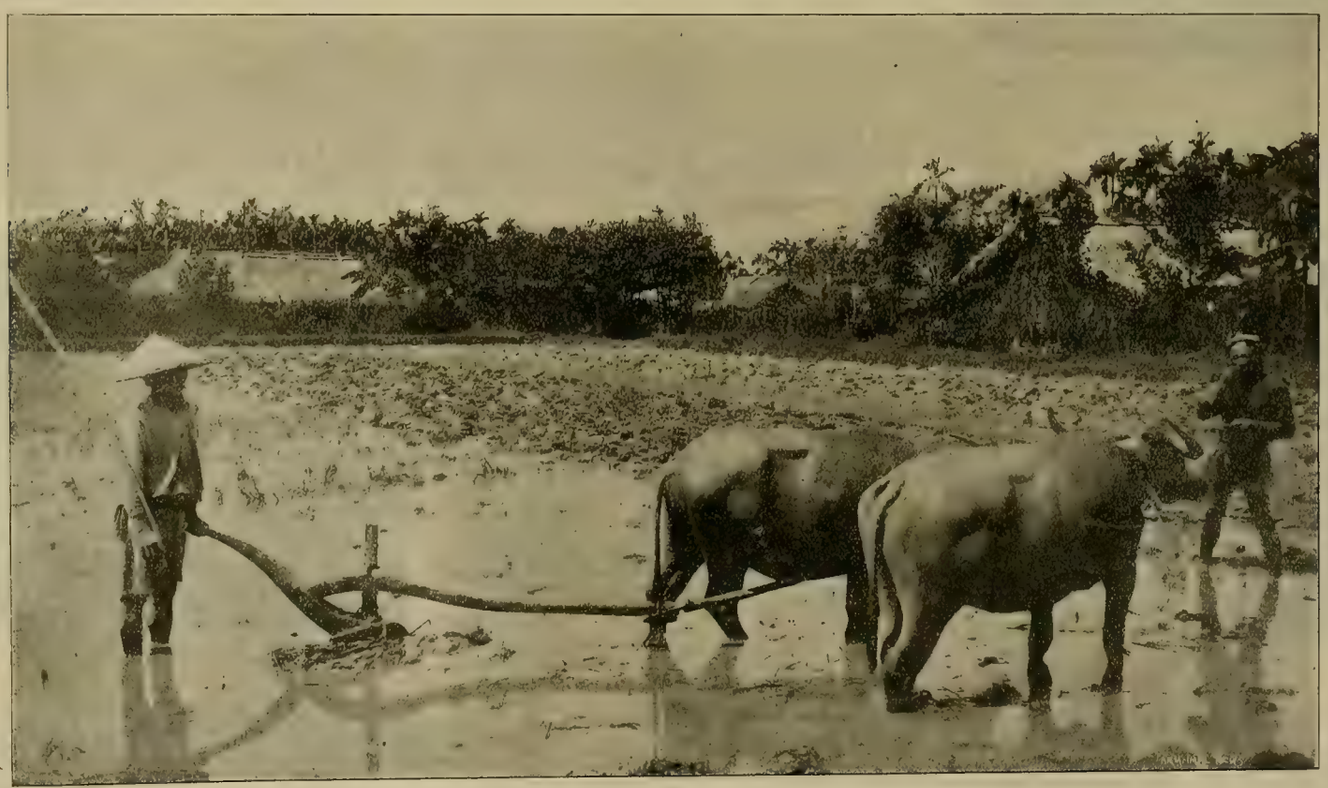
JAPANESE TREADMILL FOR WATER LIFTING.

The larger engraving shows the Japanese style of preparing rice ground with the water oxen. Rice growing on enlightened lines does not require wading around in a mud hole in this way, and the Japanese themselves have better practices which give them decently tillable ground and submergence when each is needed. But the picture is none the less illustrative of one phase of their work, which an American would never do in the way shown. He might condescend to invent a steamboat, with plows beneath or as trailers, and he would tread the deck with an air of conscious triumph; but to wade around in the mud and malaria, exhorting a pair of rebellious cattle, an American would never do, even if he had to run for office to avoid it.

An Arizona Copper Mine.

The United Verde mine of Arizona is producing about 2,000,000 pounds of copper per month, and, according to C. M. Rolker, in an interview in the Salt Lake *Tribune*, will before long output six times as much. "It is rather startling," he says, "to think of the effect on the price of copper that will be produced by such a tremendous increase in the supply. The consumption will have to be wonderfully increased to prevent the price from going down." At the rate predicted the yield from this mine alone would be 360,000,000 pounds per year. The total production of copper in the United States in 1895 was about 385,000,000 pounds, and in 1896 470,000,000 pounds, over half of which went abroad. The main hope of sustaining prices of copper lies in an increase in home consumption. This promises to grow very fast.

IT has been suggested by the Kootenay, B. C., Mine Owners' Association that the government be asked to set up monuments to which surveyors may tie up their work in surveying mineral claims. This would do much to prevent unnecessary litigation over titles to property.



JAPANESE PLOWING RICE LANDS WITH PRIMEVAL PLOW AND WATER OXEN.

The Finlayson Wire Rope Tramway at the Noble Five Mine, Sandon, B. C.

The Finlayson patent wire rope tramway, manufactured and controlled by the Colorado Iron Works Co. of Denver, Colorado, is a tramway of the double



Fig. 1.—Trestle—Leaving Upper Terminal—Side View.

rope type, automatic in the matter of attaching and releasing the buckets from the running or traction rope. C. T. Finlayson, of Denver, has patented this device, in which the buckets are attached and detached from the traction rope automatically, and the



Fig. 2.—Derrick Construction From Timber on the Ground.

buckets dumped automatically, with a view to lower cost in handling the product.

The Noble Five Consolidated Mining & Milling Co. are operating a group of five claims, located near Sandon, British Columbia. Their line was 6200 feet



Fig. 3.—Looking up the Line From the Mill.

long, with a fall in that distance of 2100 feet; the tramway was to carry 20 tons per hour. The very steep grade and tonnage seemed to require that it be constructed in two sections. The Colorado Iron Works Company held that the line could be constructed in one section, the product handled automatically, and at the same time the line be operated successfully at a low cost for transportation. They were awarded the contract, and work commenced about December 1st, 1896, and on January 14th, 1897, the tramway was in active operation, carrying the ore without any difficulty, the automatic features working satisfactorily. The Noble Five Consolidated M. & M. Co. did the construction under the supervision of Mr. Finlayson.

In the Finlayson system, the clips, to which buck-



Fig. 4.—Lower Terminal—Empty Bucket Going up.

ets are attached, are placed on the traction rope, spaced as tonnage demands. They are never taken from the rope. The clip casting is 8 inches long, and is held securely to the rope by means of dropped forged bands, which encircle the rope at either end of clip casting. This casting is of steel. The bands have the lay of the rope forged into them, so when they are brought around the rope their projections fit the rope strands exactly, and when riveted into



Fig. 5.—Tension Station—Middle of Line.

the clip casting it is claimed to be an impossibility for the clip to slip on the rope, no matter how heavy the load, or how steep the grade. It will be noticed, in attaching these clips to the rope, that all hold on the rope is taken from the outside, and by having two distinct holds on the rope, besides giving a double factor of safety, there is no liability of the rope making a short bend, and thus causing undue



Fig. 6.—Looking up From Tension Station.

wear when the clip is passing over the carrying sheaves. The hold of rope being entirely on the outside, is a very important item, as it relieves all possibility of stranding the rope.

The buckets, to which these clips attach themselves, are in the standard sizes of a capacity of four and a half cubic feet, and are hung from two pendant arms, which in turn are hung from a walking beam casting, at either end of which are the carrying sheaves which travel on the standing rope. When the line is in active operation, there are always two more buckets on the line than are actually attached to the running rope, one being at the upper terminal in the accelerating carriage, either ready to load or unload, and one at the lower terminal, either dumping or dumped.

At each terminal is an accelerating carriage, and



Fig. 7.—Looking Down From Upper Terminal.

the action of each is identically the same. Hung between the pendant arms of the bucket is what is called the "grip frame." This frame contains the automatic attaching and releasing devices. As the upper bucket comes into the terminal it passes around terminal wheel and into the releasing rods. The rods force the grip up and the clip then passes out of the grip frame and on to the accelerator. It must be borne in mind that the loaded bucket is in the ac-



Fig. 8.—Lower Terminal—Carrying up Mine Timber.

celarator carriage, and is waiting to be attached to the clip on the running rope just released from the incoming bucket. As the clip comes in contact with the accelerator, it starts the same gradually from a dead stop to the full speed of the rope. In doing this the full bucket is started and attains the same speed as the running rope. As the bucket attains this speed it is attached to the clip on the running

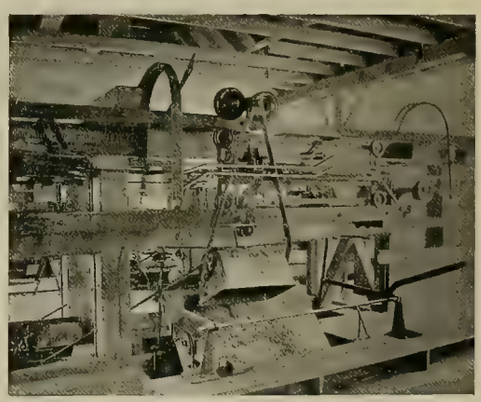


Fig. 9.—Lower Terminal—Automatic Dumping.

rope, which has thrown the accelerator out of the way. At this point the attaching rods force the grip frame down and the grip has attached itself to the clip. The bucket passes out of the terminal and on down the line. The accelerator carriage, in moving along with the accelerator, has moved the empty bucket up to the former stationary position of the loaded bucket, and in the carriage returning

to its resting position has taken the accelarator back to its proper position for again starting the bucket as the next clip comes around. The patentee asserts that this is the only device in the tramway line that attaches its buckets to the running rope at the same speed as the running rope and doing it automatically.

It will be noted that the grip catches hold of the clip and does not in any way take hold of the rope.



Fig. 10.—Looking up the Line From Mill.

As a rule, a bucket with its load weighs about 900 pounds. The ordinary speed of running is from 250 feet per minute to 300 feet per minute. In doing this work automatically it saves labor, and does away with excessive wear and strain.

On account of its flat construction the Finlayson clip can run over or under a carrying sheave, just as desired. In being able to do this the necessity of making extremely long spans is avoided, and by this



Fig. 11.—950 Feet Span—Buckets 450 Feet Above the Ground.

means the cost of construction is lessened. In the method of carrying the running rope the strain on the grips is reduced to the minimum. As this traction rope is carried on sheaves at the towers, and is always carried at exactly the same distance from the standing rope, this relieves the gripping arrangement at the bucket from carrying the entire weight and strain of the traction rope and puts it where it

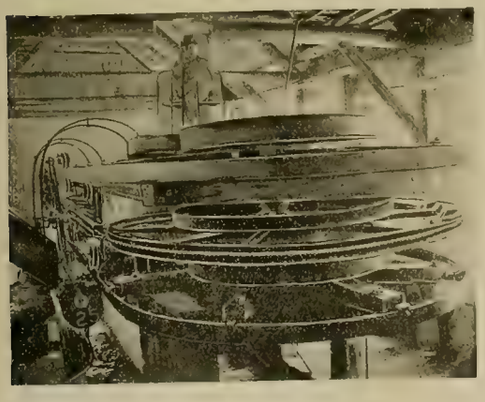


Fig. 12.—Upper Terminal.

can be taken care of with no damage whatever. The clip being able to pass under or over a sheave, lessens the cost of construction, as it enables both terminals to set on a level, and, in doing this, admits of much less material going into construction.

At the terminals are the large terminal grip wheels, around which traction rope runs. These grip wheels lie horizontal, and in face of same are the clamps, which take hold of the rope and admit of having tramway under perfect control at all times, as brake wheels are attached to upright shaft, which passes through brake wheel and grip wheel. As rope enters the grip wheel it is clamped or rather forced to the upper rim of grip wheel; it is held in this position until grip wheel has made half a revolution, when rope, running off of a true circle, is automatically released from the grip wheel. These grips are put into wheel as often as is required by the conditions of grade and load. Special arrangements have been made to take care of the tension on each standing rope. The slack of the traction rope is taken care of at the lower terminal.

At the lower terminal the dumping arrangement is attached. The empty out-going bucket dumps the loaded one, tipping the bucket completely over, thus insuring a positive spilling of its contents. The buckets are released and attached in exactly the same way as at upper terminal. The dumping attachment is positive in its action. As stated before, buckets are not taken off of the line to load or unload, unless it is desired. If this be the case, switches are arranged so that this can be done, buckets, however, being released and attached automatically.

The route over which this tramway runs starts at ore bins, which have been erected just below mouth of tunnel No. 4. All ore from upper levels is conveyed in chutes to this level; here it is taken in ore cars to bin, and from bin it is loaded into buckets, as is shown in Cut No. 12. This cut shows bucket loaded in accelerator carriage waiting to be attached to clip. Owing to the steepness of this line, it was necessary to place three break wheels on upper terminal shaft. As bucket leaves terminal it travels on frame work, Cut No. 1 being a side view of same, and Cut No. 7 being a top view. In these cuts it will be seen how the running rope is carried on the sheaves, bucket No. 39 is just about leaving frame work, and will run onto the standing rope and then on down the line. Bucket No. 41 has just come up the line and is on its way to terminal, where it will be automatically dropped from running rope at accelerator carriage, and bucket No. 40, loaded, being picked up. Bucket No. 41 shows clip in grip frame. Cut No. 11 shows buckets crossing the Noble Five slide. This span is 900 feet long, and it is 400 feet from bottom of gulch to the top of standing rope.

Cut No. 6 shows line, looking up from tension station, the long span being between the second and third derricks shown. No. 5 shows tension station with bucket No. 18 coming down loaded. As this bucket reaches the station, it will run from standing rope to rail, rope passing down to weight box, and, on running off of rail, it will run onto second section of standing rope. This cut also gives a view of sheave carrying traction rope. No. 4 shows empty bucket going up the line, having just left the lower terminal. No. 8 shows log going up the line in timber hooks, and also shows running rope on under side of carrying sheaves. No. 2 shows derrick construction. No. 9 shows interior of lower terminal and bucket dumped. This cut shows accelerator carriage, accelerator and releasing and attaching rods, and back view of grip frame on bucket 32. Bucket 31 shows front of grip frame. No. 10 shows mill and entire line. No. 3 shows mill, with office building and freight cars. Having seen upper terminal (Cut No. 12) and freight cars (Cut No. 3), one can readily understand how the Noble Five handle their product from the time the ore is dumped into bins at upper terminal. It is handled automatically, until the sacking floor for the concentrates is reached; here the product is sacked, loaded into the Kaslo & Slocan R. R. cars and sent to market.

Mr. R. M. Sherman, general manager of the Noble Five Co., tells the Colorado Iron Works Co. that all up-freight and supplies for the mine were carried on tramway and the saving thus affected paid operating expense of tramway, a large estimated wear and tear account and the interest on the investment, thus carrying their 480 tons of material every twenty-four hours for what they would have to pay for packing up freight alone.

One of the treats in traveling through the Slocan country is a ride over this tramway line. At lower terminal one is suspended nearly 700 feet in midair over 50 feet from the ground, then passed over derricks, crossing a snowslide over 400 feet between derricks, passing the tension station and over the big slide. Here, as a rule, the passengers are treated to a stop of a moment to appreciate the scenery, as well as the sensation of being hung up in midair 400 feet from the ground and on a wire rope 900 feet between supports, again moving along to the upper terminal, where a stop is made to observe how handling ore is automatically done, again climbing into the bucket, shoved into accelerator carriage and with no jar in starting speed down the line, recrossing the long spans and reaching the lower end in safety, having in forty-five minutes an experience which can be talked of for the rest of one's life.

The Colorado Iron Works Co. are now filling an order for one of the Finlayson patent wire rope tramways, 8300 feet long, which will be placed on the Sunnyside mine, near Silverton, Colo., and operated by the Terry Mining & Milling Co.

Suggestions as to River Dredging for Gold.

TO THE EDITOR:—I am pleased to see in your last issue Mr. Jno. Richards' letter about river dredging for gold. He being an authority on the centrifugal pump, what he says on that subject is well worth considering; the more especially, as developments in Feather river, both by the Pearce and McLaughlin companies, have shown that in the rocky canyons of that river the gold cannot be got in sufficient quantity to pay the cost of extraction.

But that is no reason, as Mr. Richards says, why gold may not be got in other places to pay, especially where the grade of the stream is moderate and the width considerable, having the right kind of bedrock.

Mr. Richards ascribes the failure of the Oroville scheme to want of evolution, which is the fashionable way of saying it was due to gross ignorance of the natural pneumatic principle that air will rise through water.

Now, Mr. R. thinks that with the use of methods which are no longer experimental, the gold which L. L. Robinson could not get can be got now at a profit.

No engineer will challenge that statement, coming as it does from such a careful, conservative and capable authority as Mr. Richards. At the same time, those who knew Mr. Robinson will be apt to think twice before making the attempt to find gold where he failed.

There are no great difficulties to be encountered in dredging fine silt or gravel from a soft or smooth bottom, but when the bottom of the river is a crystalline rock formation of a very ragged character, containing boulders from 100 pounds up to 100 tons weight, the difficulties then become such as require engineering skill and capital to overcome. But, strange to say, Mr. R. does not say how these difficulties are to be overcome, nor does he mention the only method whereby they have yet been overcome, viz., by the Evans hydraulic elevator.

What we would like to know from Mr. Richards is whether he would prefer to use the centrifugal pump in preference to the hydraulic elevator in dredging gravel where, as he says, "the boulders are such that one person's idea is to pass them through the pump; another, to raise them by separate tackle or apparatus; a third, to move and stir but not to raise them."

An answer to that question will enable us to form a fair idea of the feasibility of Mr. Richards' scheme to extract the gold at a profit from the Oroville bed of the Feather river. ROBERT STEVENSON.

San Francisco, June 15th, '97.

What the Telluride Ores Look Like.

Before me as I write is a box full of very rich gold-bearing telluride ores, lately come from Cripple Creek. Some of the rock has been heated, and the gold roasted out onto the surface in little round bubbles of bright yellow metal; it looks as if the rock had broken out with a violent rash of gold pimples. The remainder of the specimens are in the unaltered gray rock (presumably phonolite) just as they came from the mine. The general appearance of this telluride-bearing rock is that of a dull gray, fine-grained homogeneous mass, occasionally streaked or clouded by darker gray lines of greasy looking quartz, characteristic of what is called tellurium quartz. This is on one surface of the rock, the other, which doubtless faced the interior of the vein, is full of little cavities lined with yellowish green botryoidal quartz, upon which, here and there, are little round yellowish balls that on fracture show a starlike or radiated structure, and are probably some form of zeolite, such as wavellite. Running in and out amongst these miniature cavities, or partly surroundnig them, there appears to the naked eye a sparkling network or lace work of the bright shining tin file fakes and crystals of telluride. Sometimes these are aggregated into a brownish moss-like mass, at other places individual flakes or blades, or crystals of telluride are scattered all through the gray mass of the rock, or follow certain ill-defined minute gray seams in it.

The telluride crystals might almost be taken for native silver, only the lustre is brighter and more tin-like. The rock is sometimes quite a dark lead gray, from which the little specks of telluride glitter brightly. Under the magnifying glass the appearance of crushed masses of these tellurides reminds one of gray copper, (tetrahedrite), only of a brighter and more tin-like lustre. The magnifying glass shows sometimes a sort of columnar grouping of crystals, at others a lamellar structure like crystals of mica. They seem at times to be burnished as if oxidized, generally it is hard to make out distinct crystalline forms only broken crushed masses, glistening flakes and burnished blades. The appearance of the roasted out gold under the magnifying glass is very brilliant. The little bubbles of gold are hollow, the outside or crust of the bubble is of rough filagree bright yellow gold.—A. Lakes in Colliery Engineer.

Mining Summary.

CALIFORNIA.

Amador.

(Special Correspondence).— The Reward mill started its ten stamps again last Tuesday, after being shut down for two weeks. A new ore body over 20 feet wide has been opened by a 400-foot tunnel, but none of the rock has yet been tested in the mill.

The new 6-foot mill has been put in place at the Robinson or Monte Cristo mine, near Volcano, and is expected to begin crushing ore about the 1st of July.

The recent unwatering of an old shaft on the Mitchell mine, near Pine Grove, disclosed a ledge from 6 to 15 feet in thickness, carrying a small amount of free gold, with considerable additional value in the sulphurets.

The Marklee Mining Company has about concluded negotiations for a complete plant of machinery needed in reopening that mine five miles northeast of Volcano.

It is reported that the Fogus mill will start again very soon, with plenty of good rock in sight. Mr. W. S. Lyle, one of the trustees of the State Mining Bureau, Superintendent.

In the district round about Pine Grove wood for fuel is worth $3.50 per cord, delivered at the mines. Water for power costs about 15 cents per inch for a twenty-four hours' run.

Heavy teams—generally ten horses or mules—are now busy hauling mine timbers to the larger mines on the Mother Lode. Many of these teams pass Pine Grove nearly every day.

Pine Grove, June 22, '97.

Republican: The Zeila mill will not be started during the present month. Considerable work must be done in the shaft yet before rock crushing will again be resumed.

At the Anita a heavy flow of water was struck a few days ago, which has gradually gained on the pumps ever since. It is thought that with the present pumping facilities the water cannot be handled. This flow of water is considered a good indication.

Gates & Groome are erecting a tailings saving plant below the site of the Argonaut mill.

The Doyle Gold Mining and Milling Company has been incorporated by W. R. S. Foye, A. W. Bogart, C. D. Olney, L. B. Doe and C. E. Elliot, to work the Doyle mine on the mother lode at Jackson.

Ledger: The death of W. B. Carr caused the cessation of operations in the Gover, but Mr. Purrington soon had new capital interested, and the work of taking out the accumulated water was commenced by starting pumps and skips Monday, June 7th.

Butte.

Mercury: The Consolidated Gold Mines of California have received a boiler for the Banner mine.

The depth of the Banner mine is being increased. They will now sink to the 1700 foot level. The mill is crushing ore from the Clark & Coffee and Amosky mines. New hoisting works are in course of erection on the Clark & Coffee mine, the pumps are being lowered into the Golden Feather, and the steel derricks are in place and are being operated with compressed air—they used steam last season. The Golden Feather will be pushed hard this season; three shifts of eight hours each will be worked. In this way no time will be lost; this gives an additional force of men employment in this mine—seventy will be employed in lieu of fifty last season. The Banner mine will also handle seventy men.

The Pete Woods mine will also be re-opened in the near future—probably within ten days—with an increased force of men.

The Consolidated Gold Mines, George H. Evans, manager, will do some active work this season.

El Dorado.

Nugget: At the Pocahontas they are sinking on the 500-foot level and prospecting the property.

At the German they are getting out good rock. They are on the 100-level and sinking.

E. A. Stent has purchased from H. Koerner some properties near the Griffith Consolidated.

Encouraging reports come from the Griffith Consolidated. In the tunnel and on the 250-foot level the rock is showing up well.

In Garden valley E. W. Ashton, late of England, is making arrangements for timbering and sinking the shaft of the Garden Valley G. M. Co., known as the Esperanza.

F. M. Bell has bonded his mine, the Lady Emma, to a company in San Francisco. Work has already begun, the power being generated by steam.

The Big Four mine is being pumped out by a company in San Francisco, with the intention of buying.

Calaveras.

Prospect: At Murphys a company has recently bonded the Rocky Bar and are taking out a test crushing from the levels.

A recent milling of a few tons from the Mexican mine yielded very well and was in every detail satisfactory to the gentlemen who have it under bond.

At the Gwin it is announced by Superintendent Thomas that the result of the clean-up for last month was a block of gold weighing 152 pounds. The 40-stamp mill is kept running steadily and the works are all illuminated by electricity. Preparations are under way to pump out and repair the old south shaft, after which 60 stamps will be added to the mill, making 100 in all.

A bond has been secured by Colonel Robinson on the old Western quartz mine at Mokelumne Hill and the work of developing the property will be begun at once. This property yielded some rich ore in early days, but it had been abandoned for upward of thirty years. The colonel, having heard that a rich ledge existed there, cleaned out one of the old shafts and found at the bottom of the hole, without sinking a foot into the quartz, a large body of ore that will mill at $9 to the ton. It also shows a good quantity of galena sulphurets. As there was any quantity of the same kind of ore in sight, and as the ledge seemed to hold out well with sinking, a 10-stamp mill was purchased at Plymouth, which will be put up at once.

Arrangements have been made for the survey for an incline shaft 1100 feet deep for the Madison mine. It will be started on Gold Cliff ground, running down at an ang'e of 40°, and striking the north drift on the 900-foot level of the Madison.

Chronicle: At the Esperanza mine the shaft has reached a depth of 580 feet and the work of sinking is going steadily on. Good rock was encountered on the 400-foot level, still better on the 500, while in the bottom of the shaft the best rock in the mine was found.

Inyo.

Register: Southern Inyo is now receiving marked attention at the hands of persevering prospectors. As a result of their labors several new districts have been opened up with a very promising outlook for future prosperity, although not yet far enough advanced to determine their stability.

The Lane mine at Darwin is working three 8-hour shifs.

Mr. Newman of Tulare lately located 160 acres of placer ground in Mazourka canyon, east of Independence. It is the intention of himself and associates to run a long tunnel to secure a water supply, and develop the property on an extensive scale.

Nevada.

(Special Correspondence).—The Maryland mine keeps thirty-five stamps busy. When operated by the Idaho Company, it produced a little over $12,000,000, half of which was paid in dividends. It is a continuation of the Eureka vein, from which over $17,000,000 have been extracted.

The North Star mine, abandoned many years ago as being worthless, is still in operation, another evidence of what may be accomplished by the judicious investment of a little capital. In 1884 it was re-opened, and has since produced nearly $3,000,000. At this time it is worked chiefly on the tribute system.

The Empire mine, the oldest in operation in Grass Valley, has been developed to a depth of over 2,000 feet, and the vein at that point is very productive, keeping the 40-stamp mill busy. This mine has a recorded production of nearly $6,000,000.

The Omaha Con. is one of the great producers of this district.

The Bullion Consolidated, comprising the John Bright, Galena, Ione and Alaska claims, is developed to a depth of over 800 feet.

The W. Y. O. D. mine still continues production. It is equipped with milling, hoisting and pumping plant capable of developing it to a depth of 3,000 feet.

The Massachusetts Hill mine is in full operation, employing a large number of men on tribute and day's pay. The company has determined to sink a shaft midway between the North Star and Massachusetts Hill mines, to be known as the Central mine. A hoisting and pumping plant will be erected on the property, and it is expected the vein will be tapped at a depth of from 500 to 700 feet.

The Gold Hill mine has been re-opened. It is located on the ground where gold quartz was first discovered in California. At a depth of 500 feet over $4,000,000 was produced.

It is stated that underground operations will soon commence at the Allison Ranch mine. For over a year preparations have been going on for the resuscitation of this mine. It is now supplied with machinery capable of developing the property to a great depth. The mine is now owned by Mackey, Flood, et al., and much will be expected from it. It has been idle for thirty-five years, but during the time of its operation it produced a great amount of gold. In October, 1855, a crushing of 18 tons of ore yielded $6,000, while in December of the same year a crushing of 62 tons yielded $23,000. Mr. Mackey is expected to spend the summer in Grass Valley, and will give personal attention to its success.

Supt. Brockington is pursuing the developments of the New Orleans mine, which is situated between Ophir Hill and Osborn Hill, and is generally supposed to be an extension of the Empire vein.

At the Pennsylvania mine it is stated that every ton of rock extracted from the vein will yield $45, exclusive of sulphurets. For eight years the stockholders paid assessments prospecting and developing the mine, and when it is remembered that the company is composed mostly of Grass Valley and Nevada City business men, it must be acknowledged that they are deserving of all they receive. The shaft is down over 800 feet. It is expected that great improvements will soon be made on the property. John Eddy is the superintendent.

The Gold Hill mine, now the property of the Weissbien Bros., was recently leased to a party of Grass Valley miners for three years. It is their intention to re-open the shaft which is now 200 feet deep, and repair the plant, and push development. This mine has produced well in the past.

Not since quartz mining was placed on a practical basis have so many men been employed in the Nevada City mines. Next to Grass Valley, this is the largest mining town in the State, having an approximate population of 6000. It is also second in point of gold production. The quartz veins of this locality do not contain the same percentage of free gold, but are more highly mineralized than the Grass Valley veins, containing in some instances from 40 to 70 per cent of mineral. The sulphurets are also higher grade.

The Champion is a consolidation of several mines and ledges, and is very productive. The shaft has reached a depth of 1800 feet, with a promising vein in the bottom. Work is being prosecuted at several different levels and the ore extracted is of a good grade. Two hundred men are on the company's payroll, and over $15,000 is disbursed in wages every month. The mill has seventy stamps busy night and day. Some time ago it was reported that the London Exploration Co. was about to purchase the mine and had made an offer for it. The negotiations fell through, however, because of inability to agree on the figure which represents the true value of the mine. Fred Zeitler is the superintendent of this mine and he has transformed it into a dividend-paying mine.

The Providence mine, one of the oldest quartz mines in the State, is opposite the Champion mine on Deer creek, and is in a prosperous condition. Up to the present time nearly $6,000,000 has been extracted, and there is yet plenty in sight. The mine has been developed to a depth of nearly 2000 feet, and the vein at that depth shows as strongly as at any other point. There is a 40-stamp mill on the property, which is steadily employed reducing ore. A year ago the chlorination works were destroyed by fire, causing much loss and inconvenience to the owner. A new plant is building. The Providence is a steady dividend payer and for over two years has been under the management of William McKinley.

The Mountaineer mine three years ago was allowed to fill with water, the company having turned their attention to some new ground which they had purchased. A year later new machinery was put in and the shaft pumped dry, sunk 400 feet and levels driven from each side. W. A. Dennis has been the superintendent of this mine for the past ten years.

At the Cadmus, owned in San Francisco, work progresses. A 10-stamp mill and an air compressor have been put in.

At the Summit mine development work is being pushed. This mine was bonded some time ago by F. W. Page for a company and the sale recently consummated. The price was $50,000. The shaft has been sunk several hundred feet, and drifting on the vein is in progress. The ore in this mine is high grade. The property is under the supervision of Capt. Geo. A. Nihell.

The Reward mine, presumed to be an extension of the old California vein, is producing some good ore, and employing a number of men.

The Mayflower mine continues to be a bullion producer. There is a 20-stamp mill and a fine plant on the property. It is managed by W. H. Martin.

The Kirkham mine was bonded some months ago by a party represented by John Buffington, who is the superintendent. They have concluded to erect a hoisting plant and a 10-stamp mill.

The Murchie mine, at one time a profitable bullion producer, is still in operation under the supervision of A. W. Blundell. Development work is going on.

The East Harmony and West Harmony gravel mines are extracting good gravel.

There are several smaller mines in operation here, all of which tend to benefit the town commercially and financially. In other portions of the county the outlook is very promising, many hydraulic mines having reopened under the Caminetti act. In the Washington and San Juan districts quartz mining is quite active and some beneficial results may be expected.

June 15, '97.

Colfax *Sentinel*: A company of capitalists from Salt Lake and San Francisco have acquired a number of claims in Meadow Lake district and are negotiating for a smelter to be erected on the South Yuba river near C. P. Railway.

B. A. Cardwell & Co., who secured a franchise from the supervisors of Nevada county to construct a toll road from Cisco to Meadow Lake, have the work well under way and are working a force of twenty-six men. The road is now complete seven miles from Cisco to a point near Old Carlysle at Old Man Mountain. At this point the town site of Cardwell, three miles from Meadow Lake, has been located. The road will be completed into Meadow Lake in about ten days.

The company expects to secure a franchise from the supervisors of Sierra county to extend the road to Sierra City, making the distance from Cisco less than thirty miles.

Quite a number of mining men and prospectors have gone into the Lake district. The California Gold Mining Company, of Salt Lake, own the Washington, Crown Point, Oakland and others. A force of men have been employed and development work commenced.

C. A. Shaw, representing Los Angeles capitalists, has bonded some claims and expects soon to commence work.

Colonel Blakeley, of South America, has representatives in the district who have taken hold of some claims with a view of developing them.

A number of mining men from Salt Lake will visit the district about June 20th.

Roy Bemis, of Salt Lake, is in camp. Austin Bemis, who represents a Salt Lake syndicate, has been there this week.

Several matte furnaces and concentrators will be erected in the district.

John Clark, George Clark and Jos. William, who have had faith in the camp for many years, went in last week to commence work on properties held by them.

Telegraph: Some time ago the machinery at the Brunswick mine broke down and in the delay of repairing considerable water accumulated. But now the mine is clear of the water and the work of mining has been resumed.

Corporations have been formed by Andreas Goetz, Jose Ruiz Rojas, Charles Stepp, Gustav Ruiz Rojas and Carl Goetz to work the Texas and Minerva mines.

Union: The Norambagua mine, at Forest Springs, was worked in early days by a Sacramento company consisting of Newton Booth and his partners, at which time there were 100 men employed. It is now owned by Wm. Campbell. It is a small ledge, but the old pay shoot was 1000 feet in length. Recent work has been done on another shoot which is 300 feet long.

Placer.

Sentinel: At the Pioneer a short time ago a rich pay chute was struck on the Lynn vein in the lower tunnel known as No. 4. The chute is now over 100 feet long. The vein has been from two to six feet in width, and still shows a width of four feet in face. No. 4 tunnel is 510 feet below tunnel No. 3. The dip of the ledge will give the company considerably more than 500 feet of backs to stope. The company owns fourteen mining claims, covering an area of 300 acres. Pioneer quartz mine has for years been a heavy producer.

The Blue Canyon Mining Co. have ceased hand work in the tunnel, which is now in 422 feet. They are preparing to put in a compressor of 30 H. P., to be used to run two power drills.

Nine men are engaged working on leases at the Paragon mine at Bath. The company has 11 men at work.

The Dorer mill in Humbug Canyon, seven miles from Towle, is steadily running on custom ore.

Plumas.

Independent: The Eastern owners in the California Gold Mines and Investment Company have been inspecting their property at the old Taylor diggings, and they express themselves as pleased with the prospects, and desirous of pushing work as soon as the suit now in the courts can be terminated. This company possesses a large bank of auriferous gravel and exceptional water facilities, which can be largely augmented at a comparatively slight expense. The result of their run last year was satisfactory.

J. B. Sutton will begin the development of the Blue Ball channel struck near Quincy last fall.

Shasta.

Free Press: Cannon & Hanley have been developing a body of ore on Tom Neal creek, between the Sacramento and McCloud rivers. They have had four men at work this spring, and have run an 80-foot crosscut tunnel which tapped the ledge at a depth of 200 feet. They will now run another tunnel 400 feet to crosscut the ledge at a depth of 700 feet. The ledge is 13 feet in width and the ore carries free gold.

F. R. Enright, superintendent of the Afterthought smelter on Cow creek, is repairing and improving the smelter furnace, preparatory to a season's run. The furnace, which is the steel water jacket pattern, was not completed until late last fall, and, owing to the early rains, the plant was closed down until spring. During the winter months considerable ore was taken from the mine and roasted. The ore is very similar to that of the Iron Mountain mine. They now have 1000 tons of roasted ore on hand, and, as soon as the work on the furnace is completed, it will be started up. The plant has a capacity of thirty tons per day and was erected as an experimental one.

A bond entered into last November by Panter & Berr, owners of the Garfield quartz mine at Old Diggings, and A. Walrath of San Francisco, was given in consideration of $2000, to apply on the purchase price of the property, in the sum of $50,000. Mr. Walrath was required to perform $3000 worth of development work.

A rich strike of sulphide ore was made a few days ago on Muletown mountain on the property being worked by the London Gold Tunnel Company. An outcrop of ore near the mouth of the tunnel which the company is running was opened by blasting to a depth of 4 feet, showing a solid mass of sulphurets, which later excavations show to be about 60 feet in width. This mass of sulphide is shown by the limited tests made to carry a paying percentage of gold, silver and copper.

The Milkmaid Mining Company has been incorporated to work the Milkmaid mine, at French Gulch, recently purchased by Senator Jones and Lon Hamilton.

The stations on the new ropeway from the Mammoth-Garfield mine in Old Diggings to the smelter of the Mountain Copper Company, at Keswick, have been completed, and on Wednesday the work of stretching the cable was begun. The entire plant will be in operation in less than two weeks.

At Kennet there are eighteen men employed at the Windy Camp mine. The ore is richer in copper as depth is attained, and it holds the usual percentage of gold and silver.

Sierra.

(Special Correspondence).—The Butte Saddle mine has two tunnels, both on the ledge, the upper 100 ft., and the lower, 1100 ft., with 215 ft. backs. There is a 10-stamp mill 6,000 ft. below the lower tunnel, connected with it by a rope tramway. The ledge averages 7 ft. in width, and mills $8 exclusive of sulphurets. There are no concentrators. A recent assay of sulphurets yielded $306 per ton. The works were closed one year ago, probably not so much on account of discord, as a want of means to run a much needed lower and longer tunnel. The company began without any capital, and erected a 10-stamp mill and all the other improvements. T. J. Seitz is the principal owner. The property is in close proximity to the rich producer known as the Sierra Buttes. The formation is slate and porphyry. Water right accompanies the property.

The Bullion group comprises eight claims, and is 3½ miles northwest of town. The country rock is greenstone. There are two tunnels, the lower cross-cutting the ledge at 1,000 ft. The upper tuunel is 1,200 ft. long on the ledge. The property was worked under lease and considerably gouged, though all the work was confined to one claim. The other seven are still virgin ground. The ore by mill test averaged $7.50. The sulphurets are impregnated with galena. The property is idle for want of capital. It is owned by F. J. Cook, Spellenberg & Devine.

The Phœnix, with a good record as a pro-

ducer, fine mill and excellent buildings, is in litigation.

Few camps can produce a longer record of good properties which men sought to operate with either a limited knowledge of mining, or a too limited capital, or both; but the merit of the ore bodies, the modern business methods of mining and milling should not be long in bringing them into successful operation, and into producing mines. J. F. L.

Sierra City, June 19th, '97.

(Special Correspondence).—Situated about ½ day's drive from Nevada City, and surrounded by huge mountains, is the thriving village of Forest. From the early 60's to 1884 the annual gold product of this section reached the million dollar mark several times. With the exception of a few properties, gravel mining in this region was not carried on in any methodical manner, and yet the product of the precious metal was remunerative.

Within the past few years, however, a few capitalists have found their way hither, and to-day the outlook for Forest to again become a prosperous mining camp is very promising. This will be the case not only in deep channel mining, but in quartz likewise. The great area of country hereabouts, with its thousands of acres of auriferous gravel, following upon the success of present operators, must soon attract the attention of outside capital. There are many local holders of good properties but they lack the means for extensive development, and they offer favorable inducements to outside wealth. In future letters I will enter somewhat into detail on the several properties now in successful operation, together with the extensive and systematic plans of development work pursued.

There are thousands of acres here and miles of channels awaiting the miner's pick and shovel when capital comes to his aid. The amount of channel gold presented at Wells, Fargo & Co.'s office in Forest from week to week, and a visit to several of the mines in the neighborhood, leave no room for doubt in the careful observer's mind as to the advisability of investment in this section, nor to the practicability of making judicious purchases of channel-bed acres. It may be safely asserted, after weeks of travel through California, that few, if any sections of the State present alike favorable opportunities for rich returns on money invested in gravel mines.

The favorable location to principal stage roads, proximity to market supplies, timber and water resources, and added to these a charming mountain climate, and the rich gold deposits in the extensive ancient channel beds, being the principal feature, must ere long bring about a renewed spirit of activity in the production of the precious metal in and around the one-time flourishing mining camp of Forest City. J. F. L.

Forest City, June 20th, '97.

Siskiyou.

Under guard of four armed men, says the *Reporter*, W. P. Bennett came out of the Salmon River mines last Tuesday with $36,000 in gold, which he took to San Francisco for coinage.

Reporter: At Happy Camp, R. Aubery has shut down for the season. His clean-up was very good. This is a high channel claim. The banks run from twenty to thirty feet deep. Water is taken from Aubery Creek in a ditch thirty inches wide, a mile in length, supplying a ten-inch pipe of 750 feet equipped with a No. 2 giant.

Elliott Bros., at Cottage Grove, have just finished a four mile ditch from Shulip Creek, giving them water till August. They have about 800 feet of eleven-inch pipe, and a No. 2 giant.

News: The Klamath Flume and Mining Company will make extensive developments this season, and have established permanent headquarters at Happy Camp. The work is under the immediate supervision of T. J. Nolton. The enterprise is attracting miners and laborers to Happy Camp from all directions.

Journal: The Boyle mine, on Humbug, which it is expected to soon start up, is well equipped with the best machinery. The property has been closed down for more than a year owing to legal difficulties which have just been settled.

Trinity.

Journal: It is reported that London capitalists will soon purchase the Bullychoop mine properties.

A. N. Butts, Superintendent of the Poker Bar Mining Company, will soon start work at Poker Bar.

Tuolumne.

Independent: The Mascot mine, on Mormon creek, is having a 5-stamp mill erected. The App mine is now down 900 feet, but sinking will continue. The new mill at the Confidence mine is now crushing ore. Sinking has commenced on the Omega mine at Rawhide. The Trio mine is pushing work on their three-compartment shaft, fifteen men being engaged. A new vein has been struck in the Green mine 60 feet in from the mouth of the tunnel. The new mill at the Santa Ysabel is about completed and will shortly commence to crush the ore on the dumps. The Dutch mine has closed down, but will in all probability start up by the end of the month, by which time the extra ten stamps now being put in will be in place. Work on a large scale will shortly be commenced on the Pena Blanco group of mines, a company having been formed for that purpose by Redwood City capitalists.

Union-Democrat: The Patterson, one of the greatest gold producers of early days, is soon to be operated on a big scale. It has an immense width of vein and the plan is to quarry the rock, similar to the handling of the ore at the Alaska mines. In addition to the mill of a large capacity which will be erected, a new shaft north of the old one will be sunk to a depth of 1200 feet.

The new 10-stamp mill on the Arbona will be completed and running by July 1st. The main tunnel is in over 200 feet, with drifts running both north and south on a big ledge.

At the Black Warrior and North Star Consolidated mines on Moccasin creek the length of tunnel necessary to tap the ore body is less than 500 feet. Of this distance 270 feet is now run, and, at the rate of 3 feet for each twenty-four hours, the objective point should be reached within the next sixty days.

Work on the 150-foot level in the Maryatt shaft is being pushed south. Day and night shifts are being worked. Face of level is in good milling ore, and quality is improving as progress is made toward the Gagners ground.

G. W. Bailey and partner have struck rich gravel in their placer mine near Confidence. They are ground-sluicing, and have cleaned up quartz that will yield well.

NEVADA.

Reno *Gazette*: The Mountain Boy is owned by Griswold, McPherson, Anderson and Plane. It has a tunnel in 30 feet. They are sacking the richest of the ore taken out.

No. 2 extension is down 30 feet on a ledge 30 feet wide. This mine is owned by McClane, Pool and Bellum.

Proctor and Norris have two claims, the Ora and Jennie C. They have a 2-stamp mill, removed from White Horse, which they propose setting up.

The Crown Point parallels the Ora on the north, and is owned by Jack Sheehan. He is taking out some rich ore.

The claims visited are mostly located on a green colored butte, about 1500 or 2000 feet in circumference.

Silver State: The borax teams have arrived at Winnemucca from the Oregon refinery with 25,000 pounds of borax for shipment.

Sixty men are employed at Crevice Gulch, Gold Creek, and it is expected that the force will be enlarged shortly.

Reno *Gazette*: Olinghouse Canyon is situated about eight miles west of Wadsworth. In the Hutchinson, owned by W. J. Pollock, N. A. Hummel, W. H. McInnis and A. J. Gill, they are down on a ledge about 33 feet. The shaft is 5x6 feet and in a solid ledge that has assayed well from the grass roots down. They have about 60 tons of ore on the dump.

The Gold Center, owned by Brooks McClane, has a tunnel in 20 feet.

UTAH.

Mercur *Mercury*: Immense ore reserves, whose presence was unsuspected two years ago, are being developed by the open-pit work at the Mercur mine.

The owners of the Camp Floyd group, near Five Mile pass, propose to resume work soon. While doing the last work on the property a body of ore 20 feet thick and averaging $3 was cut, and the vein has since been traced around to La Cigale. By drifting on the ore body it is believed that milling values will be obtained.

Salt Lake *Tribune*: At the Eagle at Tintic arrangements are being made to put the low-grade ores into marketable form, and to that end 1000 tons are to be run through the Sioux mill. The ore, it is said, shows a valuation of $15 in gold and 12 ounces silver per ton, and should it be demonstrated that the ores can be successfully treated through the Sioux mill it is very likely that a plant will be erected and the handling of ore in large quantity at the Eagle undertaken.

At the Niagara mill Col. Heffron is now rushing through fifty tons a day of gold bearing ore, and to increase the amount four new tanks are being added.

Tintic *Miner*: Shipments from the district for the week are as follows: From the Bullion-Beck, 20 carloads ore; Centennial Eureka, 5; Ajax, 2; Sioux, 1; Swansea, 1; South Swansea, 7; North Star, 6; Buckeye, 1; Four Aces, 1.

The Gemini Company has made an ore contract with one of the Sandy smelters, and it is expected to commence shipments at once.

The new tunnel on the Uncle Sam is in about 30 feet and is going ahead at the rate of about 4 feet a day. It is about 400 feet down the hill from the first tunnel in which ore was struck, and will tap the vein at a depth of about 200 feet lower.

The Southern Eureka shaft has reached a depth of 375 feet. Crosscutting will not be commenced until the 500-foot level is reached.

A six-carload shipment from the Uncle Sam is being loaded and will go out in a day or two.

A. A. Noon is driving a tunnel to develop his iron mine east of Eureka.

Sinking in the Alaska shaft has been commenced by the contractors. The shaft is now down 155 feet.

A shipment of 500 tons of second-class ore is being made from the Spy to the Sioux mill for a test run, and if the result is favorable a large quantity of the ore may by worked.

Eureka *Democrat*: The tunnel of the Eagle has been progressing steadily, and an upraise from the 700-foot station has been run.

At the Alaska work is being pushed rapidly and contractors are again sinking on the shaft, which will be put down to the 400-foot level.

Bingham is suffering from the increased rate of marketing ores, and several of the old producers will shut up until more favorable conditions prevail.

Another strike is reported in the Uncle Sam tunnel at a point 248 feet from the mouth. It is said that 12 feet of ore has been encountered.

Bingham *Bulletin*: The Argentine group, on the Tooele side of Clipper Hill, has a crosscut tunnel in 900 feet, at about 750 feet depth, and it is to be continued 300 feet farther, to catch the main vein. Five veins or spurs were encountered in its course, but no drifting has been done. There was some time ago talk of a combination to extend this tunnel through the hill a distance of 3000 feet.

There is considerable activity at the Winnamuck, it being the intention to put the mine in condition for quite extensive operations, ready for any move that may be decided upon. A contract has been let to sink the Winnamuck incline 120 feet, and work will begin as soon as the water can be pumped out.

Col. Heffron is increasing the capacity of the Niagara cyanide mill, and his operations will be much more important than last season.

Park *Patriot*: Arrangements for the resumption of work on a large scale in the Daly-West are almost completed. The smelters are beginning to look for a favorable chance to descend from their high monopolistic perch.

Ore shipments this week: Silver King, first class, 361 tons; Anchor, 11; Daly-West, 202½; Silver King concentrates, 138 tons; Niter & Reece concentrates, 22 tons.

Mammoth *Record*: Sinking on the main shaft of the Boss Tweed is still being continued, and a depth of 200 feet from the tunnel level, making in all 400 feet from the surface, has been attained.

MONTANA.

Spokane *Chronicle*: At the present time one of the largest steam dredges ever used in placer mining is earning $600 a day in the bed of Grasshopper creek in Beaverhead county. It can handle from 4000 to 5000 yards of dirt every twenty-four hours. A larger dredge is being built in South Milwaukee for the same company. There is, perhaps, no place in Montana, where the dredge can be used with so much success as in Grasshopper gulch. For many years the bed of the creek has baffled all ordinary methods of working. The gold in that gulch dips at bedrock from 20 to 30 feet below the surface, and because of the excess of water it could not be worked by either shaft or tunnel.

The success of the steam dredge in Grasshopper gulch has induced an Eastern company to buy up a large part of Alder gulch with a view of putting in a machine or two there.

There is a steam dredge in Mitchell's gulch, near Helena. It is not in operation, but will be in a few days, having just been shipped in.

Altogether it seems probable that through the dredge scores of old placer grounds that were once abandoned will be reopened again. Ground can be worked with the dredge at a cost of from five to eight cents a yard.

Inter-Mountain: The new engine to be used at the 1400-foot level in the Green Mountain mine of the Anaconda company will be used to develop the shaft. It was at first intended to sink the shaft an additional 200 feet, but since the installation of the big engine it has been decided to sink 400 feet, making the total depth of the shaft 1800, 300 feet deeper than any mine in the camp. The High Ore shaft, however, is being rapidly developed and will possibly be 2000 feet deep before the Green Mountain crew reaches the 1800.

News has been received in Butte of the closing down of the Mohegan mine and mill at Red Bluff. The Mohegan has been operated by a Boston company since last Fall and it was understood that the mine was paying. One of the Boston officers states that he has orders to close down the whole works.

In the Lucky Dream in the Gaylord district the workmen have struck a big body of gold ore at a depth of less than 100 feet. The claim adjoins the Spread Eagle only a short distance from the celebrated Mayflower and is owned by three Butte men, who leased and bonded it some weeks ago to Upton, Williamson and others.

The Mayflower a few weeks ago ran into a another rich ore shoot and the miners have since been steadily employed.

On the adjoining claim, the Celebration, Sam Ayotte has a force of men extending the tunnel which was run by the Knight brothers.

Butte *Miner*: The Weasel Gulch Mining Company's holdings in Granite county comprise sixty acres of placers in Bilk gulch, and are being worked by hydraulic. The company put in a plant two years ago, costing $60,000, which carries the water 800 feet high to a large storage reservoir. At the present time the company has men washing gravel.

Ore was discovered recently in the Homestake in Jefferson county near the surface, and widened out as it went down. To a depth of 75 feet the ore is of an oxide nature, carrying gold, and below that is changed to a sulphide, carrying at the 100-foot level about 2 per cent copper. The company has announced its intention to continue the sinking of the shaft 500 feet.

Leasers on the Michael Devitt lode claim, which was sold for $351,100, are taking out about sixty tons of ore daily that is very rich, going about 30 per cent copper.

COLORADO.

Republican: At Cripple Creek the Moon Anchor yields per week about 100 tons of low grade ore, most of which is stored for the mill. The company will join the Anchoria Leland and the sampler combine in building at Colorado City.

The connection has been made between the Moon Anchor shaft and the Cripple Creek and Gold Hill tunnel at 320 feet depth, and in 200 feet of drift. Water pipes are now being put in, and in a short time drainage through the tunnel and work in the lower levels of the mine will be resumed.

The Cripple Creek and Gold Hill tunnel is now within a few feet of 2300 feet into the hill, has passed through the Bonanza King and is now in Lilian Leland ground. With the perfect air given by connection with the Moon Anchor, exploitation on the Midget ore body will be resumed in a few days.

So far this month the Anaconda has shipped 180 tons of mill ore of an estimated average grade of $30 a ton, and there are now in the bins from 75 to 100 tons of the same grade.

A new plant has been ordered for the Standard tunnel, being run into Beacon hill by New York capital, and contracts are being made with lessees on the west slope of the hill, with the understanding that the new plant is to be in operation within thirty days. The bore has been run by hand to within 360 feet of the Fanny B. vein.

W. G. Harden and John Spreyer are working the Pride of Cripple Creek on the east slope of Ironclad, under bond and lease that has eighteen months yet to run. While working through the old shaft on the property and mining two grades of ore at 75 and 200 feet depth, they are sinking a new shaft.

The Callahan shaft on block 17 has opened a fine body of sylvanite ore at 100 feet depth, and is looked upon as the most important ore body that has yet been opened in the hill at that depth.

The Burns shaft on the Portland has passed the 800-foot point, and a sump is now being cut. The mine is producing heavily, and both the lower levels, that at 600 feet and the other at 700 feet, are yielding large quantities of high grade ore. A new 12-drill compressor is now in operation.

J. H. Sanborn, manager of the Little Montana Company, associated with D. H. Fuller and W. E. Upjohn, of Kalamazoo, Mich., has secured, under a bond and lease of two years, the Burns, of Bull Hill.

A party of Leadville miners have taken an eighteen months' lease on the Kacinko, on Guyot Hill, and will put on a new hoisting plant.

The shipments from the Orpha May, of the Union Gold Company, during the past week amount to nine cars, two of which were high grade.

The Uinta tunnel, from Eclipse gulch has reached the greatest depth it will attain, and is cutting under the summit of Battle Mountain, more than 1100 feet from its head.

The Old Gold tunnel into Beacon is being pushed steadily by hand, is now 300 feet into the hill. It has passed through the Raaler and is now in Columbia ground, and is nearing the phonolite dike, along which values are expected.

There is unusual activity in the mining districts of the LaPlata and Needles mountains. Fully 200 men are at work developing the numerous mineral lodes of those districts, and others are going in for the purpose of prospecting further.

At Guffey the Carbonate King, backed by Denver parties, is pushing work in the shaft down 295 feet.

The American Flag, an incorporated company with B. Wey as manager, whose property is located half a mile northwest of town, has 400 feet of tunnel and is developing a group of patented claims with large bodies of low grade ore in sight.

The Manchester Gold Mining Company is down 90 feet and working night and day shifts.

The Annie Laurie, owned by H. L. Pigg and J. W. McBeth, is down 125 feet.

The Union Co-operative Mining Company has good showings with twelve men working three shifts. The shaft is down 166 feet, and the company will put on a steam hoist at once.

The Hub Hill Finis Mining Company, of which E. Prewett is manager, is down 50 feet on the Hub Hill shaft, and will put up a whim at once.

Dr. A. Harvey, of Denver, and others are driving the Sylvanite tunnel, and are in some 300 feet.

At Idaho Springs Darling & Metcalf, of Denver, have finished installing their plant, and are ready to resume the development of the Falu claim, from which some very rich ore has also been taken quite recently. They have a shaft to a depth of 200 feet, and on one wall have about 18 inches of solid mineral, carrying a high percentage in copper and gold.

John Owen is extending the levels on the Gum Tree mine from the shaft at 240 feet. He has one foot of smelting ore and some mill dirt. The streak is copper-iron.

The Trail Run Company has opened up from 2to 3 feet of pay ore in the Magnolia lode, on which they are now sinking a shaft.

BRITISH COLUMBIA.

Rossland *Miner*: Crosscuts about 40 feet long have been run on either side of the main tunnel at the east end of the ore chute, and neither crosscut has yet found the wall. In other words, the ore body has been proved to be more than 80 feet wide. A crosscut has just been started to the south, 120 feet west of the first crosscut, and this is now in 10 or 12 feet with a magnificent body of ore in sight. The ore seems to be quite uniform in character. It carries a certain amount of waste, but taken as a whole, it carries high values in both gold and copper. The gold-bearing substance is a sort of rotten black quartz. Small pieces of pure sulphide, showing much copper, are scattered through the entire mass.

At Sandon the trail for the Payne tramway has been completed and work on the tram proper will be commenced at once. A force of about eighty men will be employed. They are at present shipping two cars of ore per day, which will be increased to three cars next week.

The Slocan Star shipped during May 800,000 pounds of ore over the Kaslo & Slocan.

Work will be resumed on the Canadian group at once.

Tho Freddie Lee has resumed operations.

Work has been resumed in the shaft on the Boundary Creek Mining and Milling Company's G. A. R. claim, Providence camp.

Rosslander: On the Old Gold four men are working on a tunnel which is in 55 feet. The lead is expected to be tapped in about 30 feet.

Four men are working on the Denmark and Seattle, two claims of the Seattle group, on Whiskey creek. A shaft is being sunk on the vein.

Seven men are working on the Little Giant and are down about 60 feet. The vein is a quartz mixed with iron.

The shaft in the Columbia is down 25 feet; the contract is to sink to 75 feet.

On the Ibex a contract has been let to continue the tunnel, now in 162 feet, for 50 feet further, with an option of 100 feet.

(Special Correspondence.)—While it is true that there are but few proved mines in the districts along the coast proper, the prospects

in the immediate future are very bright indeed. In West Alberni, on Vancouver Island, many apparently very valuable copper deposits have been located.

On Lynn creek, opposite and a few miles from Vancouver, smelting propositions are being worked that run $5 on the surface.

In Harrison Lake district the Providence mine is shipping to Tacoma, and the results to date are excellent, the ore running $100 in gold and silver. In the same district a large amount of money is being spent on the Money Spinner, whose vein runs vertically down the mountain side. This vein has been stripped 130 feet, and its 18-inch pay chute runs high in free gold. The vein is a true fissure.

At Lillooet the Golden Cache Company are putting up their mill and will commence crushing their free gold rock in August.

At Fairview, in the Okanogan country, the Tinhorn Company are waiting the arrival of their San Francisco mail to commence crushing. Their mine is proved for 1400 feet, and all is ready for feeding the crusher.

Vancouver, June 17, '97.

Nelson *Miner*: Returns of produce of the Kootenay mines to June 12 for this year are as follows:

ORE EXPORTED.

	Tons.
From Slocan via Kaslo	11,649¼
Slocan via Nakusp	2,842½
Rossland via Northport	7,673¾
Rossland via Nelson	52
Total	22,217¼

Total Value:—

Through Nelson Custom House	$1,258,362.37
Through Revelstoke (Nakusp)	306,919.65
Total	$1,565,282.02
Average value per ton	$70.453

PRODUCE OF SMELTERS.

	Tons.
Nelson (Hall Mines) Matte	536¼
Trail Smelter Matte	3,046¾
Total	3,642¾
Total value	$1,676,905.80
Total value of ore and matte exported	3,242,188.91

OREGON.

Baker City *Bedrock-Democrat*: At the Con. Virginia the buckets in the shaft have been replaced by cages. A depth of 600 feet has been attained in the shaft and crosscutting to the Virtue ore vein is to commenced at once. This property is being worked by David Keith, of Park City, Utah.

At the Virtue mine the shaft is 800 feet deep, and to this level the big pumps are being lowered from the 600-foot level. Larger and richer ore bodies are exposed in the lower workings than above.

Bradbury Bros. have made another quartz strike at the Cliff mine, north of the Flagstaff, where they have a ledge 5 feet wide in the drift in the bottom of the 80-foot shaft.

The Eastern Oregon Gold Mining Company has filed articles of in corporation. It is formed to work property in McCord gulch.

At the Baisley-Elkhorn there are thirty men employed.

B. B. Shepherd, who has been selected by the California people having a bond on the Cyclone mine as their superintendent in charge of operations, will put a force to work and deep sinking will commence.

Rogue River *Courier*: The Blue Bucket ledge, like that of the Lost Cabin, seems to be turning up in all portions of the coast. A party is now out in Grant county expecting to find gold by the bucket full, according to the legend. The Lost Cabin mine has not been found now for several months. Any person who knows of its whereabouts can get up a party of prospectors in Grant's Pass.

A San Francisco company is about to work the Philips-Strong copper ledge, a mile and a half from Waldo. The ore is situated in a creek bed, where a pumping plant will be put in to keep the shaft clear. The rock assays 20 per cent copper and $10 a ton gold.

The Lewis mine cleaned up last week and the result was highly satisfactory. A great deal of money has been expended in putting these diggings in shape.

The Baylord-Iliff pump works are running in daylight hours with seven men.

The Coast Range Mining Co. are running their pump works ten hours each day, just below Woodville.

Medford *Mail*: C. E. Smith on Little Applegate has a ledge 50 ieet in width which, while the ore is not high grade, will be a good working proposition.

Articles of incorporation have been filed in the Secretary of State's office incorporating the Pearl Minning Company, with a capital of $110,000.

The Elk creek mining excitement has gone a-glimmering, in the minds of most people. One party reports an abundance of ore there, but it is so low grade it will not pay for milling. While it is true that the majority of reports are derogatory, it is, as well, true that some are favorable. It is reported that there are between 600 and 700 people at the mines, and that the district is fifteen miles in length and five miles in width.

On the Great Applegate Mining Company's ditch there are from fifteen to twenty men at work.

WASHINGTON.

Spokane *Chronicle*: Around the headwaters of Flat and Fifteen Mile creeks, on the reservation, are some of the best mining prospects in the State. This district lies about ten miles southwest of Rossland. The formation is the same and the character of rock is similar. It has the same iron capping as at Rossland, but more highly mineralized. The rock carries gold, silver and copper.

The Alert Mining Company of Seattle own a group of five claims. Most of the work has been done on the Alert claim. In running a tunnel they have crossed a well-defined ledge and are now going down on it.

On Iron mountain the Lafayette Mining Company own three claims. The company have commenced work on the Lafayette claim.

At Goat creek, Okanogan county, there are more men at work than ever before in the history of the camp, and strikes of rich gold-bearing ledges are not of infrequent occurrence.

A number of claims have recently been bonded to Eastern capitalists. John Donnelly of Spokane has taken a bond on the Handley group, which is located on Goat creek, for $30,000.

The Perrines group of three claims, in the same locality, have also been bonded for $75,000. Both these properties show good ore bodies very near the surface.

The Black Warrior Company are working two shifts in their tunnel, which is being run to cut the ledge.

IDAHO.

Cœur d'Alene *Press*: Kendrick reports that travel toward the old gold fields of the Florence, Elk City, Warren's and Pierce district, still continues in large numbers, the disappearance of the snow having a great effect in livening up travel toward these districts.

The Banner shaft, at Florence, is sunk to a depth of 190 feet, and shows a well-defined ledge, four feet in width. Owing to water interference, work has been suspended until the new steam hoist can be put in. They have about 600 tons of ore on the dump, and they say they will put a 10-stamp mill on the property as soon as it can be done.

On the Toledo the ore is said to be quite rich. A force of men have been put to work on the property.

The Tiger-Poorman mine at Burke, in the Cœur d'Alenes, shipped 1980 tons of concentrates for the 27 working days in May. Its new plant is hoisting 400 tons of ore daily from the 1100 foot level. One hundred and fifty men are employed, and the mine and mill are working night and day. The monthly expenditures are about $27,000, and the average wages are $3.72 per day. In the mines development work is well ahead. They are still sinking on the main shaft, which is now down 1200 feet, with a 14 foot ore body.

Idaho City *World*: D. B. Huntley, superintendent of the De Lamar mine, has been examining the Lucky Boy mine for the Englishmen to whom Vivian Thorne is endeavoring to make a sale. The Lucky Boy has a big ledge, 75 feet wide. It is believed that the entire ledge will pay from wall to wall with a big mill. Different good-sized veins carry high-grade ore.

Elmore *Bulletin*: The owners of the Idaho Consolidated mines, near Rocky Bar, have let a contract for running a tunnel 250 feet in length upon their claims. This company has been idle for a great many years.

Knittle, Brainard and Cook recently discovered extensive placer mines on the banks of Bear creek, about one mile below Rocky Bar.

In the Neal district the Hidden Treasure mine under the management of F. Howe is working twelve men with good results.

Spokane *Chronicle*: In the Jerome mining district the Gold Bug has made a strike of a much better chute of ore than has yet been shown on the property or even in camp.

The Daisy stamp mill has been started and will stamp outside ore, yet a little ore from the Daisy mine will be crushed.

Jesse Bishop, one of the owners of the Bishop mine, reports that work will begin on that property soon.

Work is still progressing on the Gypsie, the ore showing a better color and quality than heretofore.

Spokesman-Review: One of the first Cœur d'Alene quartz mines to be developed by home capital was the Daddy, of which the Coplen brothers of Latah were the original locators. Ever since the mill was started there have been three kinds of rock in each ledge worked—there are five or six running through the ground. One is a low grade rock that barely pays for mining and milling. It is in the way, and must be removed. This quality of ore is found in large quantities, the mill working on it almost exclusively for weeks, and sometimes even months at a time. Again, at times the rock changes into a grade yielding about $20 per ton. Then there is another kind found in pockets that carries values varying from $30 to $2000 per ton. They have a 10-stamp mill, which crushes from twenty-five to fifty tons of ore about 340 days out of the year. Since it was first started, it has run almost continuously. About thirty-five men are employed now in mine and mill.

There is considerable development work being done in the Willow creek district, in Boise county, and not a little money being invested by Salt Lake, Ogden and Pittsburg people. A syndicate, headed by A. G. Duey of the Trade Dollar mine, at Silver City, has purchased about twenty claims in a group, and considerable machinery is being put in. Among the shipping mines are the Last Chance, Red Warrior and Checkmate. Over 4000 locations have been made in the district during the last year. Pearl is the principal town, and is reached by stage from Boise.

At Murray the lower or new mill of the Golden Chest, that has been idle since last January, will start up soon. The Golden Chest is one of the properties bought by Louisville men in the early days, and, with the high freights, high wages and extravagant management then prevailing on the North Fork, by the expenditure of $190,000 the owners succeeded in erecting a 5-stamp mill on almost the highest point of the claim, above most of the ore and water, that would not pay running expenses. When three different companies, organized in Louisville, spent $725,000 for ground and in making improvements thereon, the North Fork was wild with joy, and yet that very investment cost the camp many times as much, for none of the investments paid under the mismanagement with which they were cursed, and their failure caused a distrust of the whole district by men who had money to spend in exploiting mines. That this distrust was not warranted by any fault of the natural conditions of the district was known by everyone resident here. Ore has been blocked out in the mine until there is enough in sight to last for a long time to come. About twenty-five men are now on the pay-roll, which may be increased to thirty when the lower mill starts.

ARIZONA.

Tucson *Star*: There are several small camps springing up tributary to the Saginaw. Dr. Purcell Sr. has established a camp two miles east of the Dakota mine and is developing a prospect.

Connell & McKay have a camp north of the Saginaw, called the Golden Flat camp, and are developing some old properties and have some good ore.

F. A. Drake and Col. Seibert have established a camp east of Saginaw and are developing a gold prospect.

The Saginaw is working thirty men, and the force will be increased sinking, drifting and crosscutting. A drift is in on the ledge 45 feet and crosscut 8 feet.

The mill is running in connection with the Wifley concentrators, working ore from the Dakota mine.

Prescott *Journal-Miner*: J. C. Rankin has closed a deal with Dan Thorne for his mine near the Goodenough, on the Santa Maria. About $50,000 is the purchase price.

L. A. Davies of the Sun Dance Mining Company is shipping two carloads of concentrates, the product of his mill since starting up.

Deeds from C. N. Fowler to W. P. Stevenson, and from the latter to Arizona Onyx Company, for the Big Bug onyx property, have been filed for record.

Mr. Penrose is engaged in building a mill at the Pearce mines, below Wilcox, that will work forty tons per day; it is, however, being so constructed as to be increased to eighty tons per day. About one-half of the output is gold at the present working depth. At first about three-fourths of the output was silver.

The Monte Cristo mine on Groom creek continues to keep up its record, both in richness and quantity of its ore. The tunnel is now in 330 feet. In the face of the tunnel the ore body is from 12 to 18 inches wide.

A. McCann, who recently purchased from Shackelford, Marsh and Ainsworth, the Fortuna mill and an interest in a number of mining claims at Minnehaha, will start up a complete cyanide plant about June 25. He has about 4,000 tons of old tailings which according to samples will go $5 per ton. They can be worked at a cost of $1.30 per ton.

Kingman *Miner*: B. F. Shaw has leased the old dumps of the Keystone mine, and after getting into the early workings found ore that was thrown over that runs 1600 ounces in silver and several ounces in gold.

Twenty men are working for the Southwestern Mining Company at El Dorado canyon.

The mill of the Elkhart will be completed and ready to run on or about the 20th of July. It will handle 100 tons of ore daily.

Republican: The Empire smelter has been running for seven days—running eighty tons through per day. The Old Flux and Hard shell mines are furnishing the ores. About 100 tons are being delivered per day at the smelter. These are lead, silver and gold ores, so that their lead bullions will be high grade.

Geo. H. Miles' mine, one mile south of Yuma, has been bonded to Edward Gronendyke and D. D. Fowler of Pasadena for $4,000.

Silver Belt: The progress and importance of Arizona's mining industry is remarkable when we consider that the surface of our ore-seamed mountains has only been scratched. There are few examples of deep mining in the Territory, yet those exceptions (the Congress mine being a notable instance) encourage the belief that our mines go down, and as this opinion becomes generally recognized an impetus will be given to deep minining.

The Black Warrior Copper Company on its several claims in Webster gulch is running five levels in the Black Copper mine, the lowest at a depth of 340 feet, and developments are very encouraging. About twenty-five men are now employed by the Black Warrior Company and the force is to be further increased.

Superintendent N. L. Amster is preparing to begin work on the Excursion group of gold mines at Payson, recently bonded by his principals, the North American Exploration Company.

On the Continental property fine ore has been encountered in the drift from the 50-foot level of the 96 shaft, and which is believed to be the continuation of the main ore body opened by the working shaft, 300 feet distant. The mine is being well opened and ore is exposed in many places.

NEW MEXICO.

New Mexican: In the Moreno valley, near Elizabethtown, a number of reservoirs in the foothills, pipe lines extended into the valley, and several companies are at work washing away the hillsides by hydraulic machinery and saving the gold in sluice boxes. In the Moreno valley are rich placers, but the lack of sufficient fall to carry off the tailings has heretofore prevented the successful working of this portion of the deposits.

On the Red Bandana quartz mine a tunnel has been driven into the hill 2,500 feet, a shaft sunk 200 feet and a mill erected.

On Baldy mountain the Aztec has been worked to a depth of 300 feet and for 1200 feet along the vein, and is equipped with a 40-stamp mill.

The Black Horse has two veins running parallel about 90 feet a part. The workings consist of 3000 feet of shafts and levels. A 10-stamp mill is on the property.

In the Ponil district, on the French Henry, a 15-stamp mill is run.

AFRICA.

African Mining Journal: Before the Mines Commission the secretary of the Rand Mines, Limited, gave the following percentages of costs of working in the Geldenhuis Deep:

	Per cent.
Native labor	21.20
Native food	3.89
White labor	35.89
Coal	8.45
Dynamite	10.70
Cyanide	2.20
Zinc	.15
Oils and lubricants	1.00
Candles	.40
Dies, quicksilver, mill-cleaning	1.00
Sundry stores, assaying, chemicals, machinery	5 60
Insurances, licenses, rents, printing, native premiums, sundries	5.5

Hennen Jennings presented to the Government's Mine Commission the following comparison between the costs of the Crown Reef and Alaska-Treadwell. They prove that the Crown Reef, working on American prices, might have saved 5s 6d per ton, exclusive of coal, though white wages are at least as heavy in Alaska as they are in Africa:

	Amount used.	Alaska price.	Crown Reef price.
Dynamite	200,089 pounds	£5,134 11 2	£17,354 12 2
Fuse	14,314 coils	474 5 0	268 7 9
Caps	75,133	168 5 0	150 8 0
Timber	14,909 cu. ft.	482 0 0	3,168 2 0
Steel, mining	25,519 pounds	429 16 5	637 18 0
Oils	6.545 gallons	428 3 5	1,309 0 0
Candles	272 boxes	177 15 0	145 0 0
Mortars	2	96 0 0	304 0 0
Mortar liners	58,058	756 12 0	1,209 10 10
Cam shafts	3	59 4 0	52 10 0
Guide blocks	120 pairs	32 16 0	856 0 0
Shoes & dies	151,932 pounds	2,178 17 3	2,278 16 8
Screens	1,300 sq. ft.	109 6 0	97 10 0
Heads	12	49 16 3	73 0 0
Sulph. acid	328,000 pounds	1,000 0 0	4,100 0 0
Salt	455 tons	790 8 6	2,733 0 0
Bar iron	63,503 pounds	275 9 0	529 5 10
Lead	1,461 pounds	18 4 6	52 11 6
		£12,651 10 0	£35,324 10 9

Mr. Jennings showed that 185 companies have been floated in this Republic, with a capital of £45,000,000. There have been 5135 stamps erected; in 1896, 3470 were running. The decrease is chiefly due to the fact that light stamps have been superseded and heavier stamps are now in use. But since last year the number of companies working has been reduced to nine—which is due to the impositions set upon the industry. Mr. Jennings calculates that 1000 fresh stamps will be set to work during the current year if conditions are favorable.

Mr. Catlin, the mining engineer of the Simmer and Jack group of companies, explained the working of the bonus system. In the month of April, in the Catlin shaft, 142 feet were sunk by hand; the bonus amounted to £483, in addition to the wages of the miners. This is a record sinking, not only for the Rand but for the world, and this system enables more work to be done at a less price than any other system. Common experience shows that in the ordinary way, by daily wages alone, without bonus, a progress of 80 feet per month is very good work. The result in the Catlin shaft is that, if only 80 feet had been sunk at a daily wage, the cost per foot would have been £24 1s 1d. As a matter of fact, the sinking was 142 feet and the cost per foot was £19 7s 10d, thus saving the company £289 1s 6d and giving them 62 feet more of sinking in the shaft.

The following figures are from the returns of the Geldenhuis Deep for the first quarter of 1897:

	January.	February.	March.
Number of stamps running	130	135	155
Days milling	25½	24	27
Mill: Ore crushed, tons	14,400	14 475	18,345
Yield in bullion, ozs.	4,158	4,249	5,840
Tailings treated, tons	11,280	11,690	14,655
Yield in bullion, ozs.	2,844	2,702	3,243
Total yield in bullion, oz.	7,002	6 951	9,083
standard gold, ozs.	6,240	6,252	7,600
Revenue	£23,855/	£24,145/	£30,060/
Working expenses	£19,420/	£18,690/	£22,000/
Profit	£4,535/	£5,455/	£8,060/
Cost per ton	£1 6 11½	£1 5 8	£1 3 11½
Profit	£0 6 3½	£0 7 6½	£0 8 9½

The following is from the report of the City and Suburban for March: Profit for month, £11,426 8s; total expenses per ton, 24s 8.0051d; value of yield per ton, 35s 7.9004d; profit per ton, 10s 8953d; estimated quantity of ore developed at March 31st, 366,118 tons. The milling results for the month are as follows: 160-stamp mill worked 28 days 12 hours 11 minutes; tons (2000 lbs.) crushed, 20,030; tons crushed per stamp per day, 4.391; yield in smelted gold (equal to 5,809.2464 ozs. fine gold), 6,504.2 ozs. bullion; yield in smelted gold per ton (equal to 5.8005 dwts. fine gold), 6 4944 dwts. bullion; assay value of tailings per ton in fine gold, 4.37 dwts. The results from cyanide treatment for the month are as follows: 15,592 tons treated (2000 lbs.) at a cost of 2s 8.1084d per ton (equal to 77.84 per cent of the tonnage crushed); assay value of sands per ton before treatment, 4.78 dwts. fine gold; bullion produced (equal to 2,633.8344 ozs. fine gold), 3,319.9 ozs.; yield of gold in bullion (equal to 3.3784 dwts. fine gold) per ton treated, 4.2584 dwts. Slags containing 90.1435 ozs. fine gold have been shipped. Yield in fine gold per ton crushed—by mill amalgamation, 5.8005 dwts; by cyanide treatment, 2.6298 dwts; by slags, 0.0900 dwts; total yield per ton (in fine gold) from all sources, 8.5203 dwts. During the month 351 natives were engaged, 114 were discharged, and 120 deserted, making a net increase of 117 men. An average number of 2319 men were employed during the month, as compared with 2288 in February.

AUSTRALIA.

The Queensland gold returns for May are as follows:

	Tons Crushed.	Yield in Ounces.
Charters Towers	34,300	27,200
Mount Morgan	7,300	16,700
Gympie	4,800	6,500
Croydon	5,800	7,200
Other Fields	7,400	6,800
Alluvial Gold	....	2,600
Total output		67,000

The calls paid for the Charters Towers district amounted to £5000, and the dividends to £17,100. Gympie calls, £8900; dividends, £8500. Croydon calls, £2000; dividends, £1500. Mount Morgan, no calls; dividends, £25,000.

Mechanical Progress.

The Use of Compressed Air for Mining Purposes.

NUMBER VII—CONCLUDED.

A lecture delivered to the Engineering Students of the Leland Stanford Jr. University, May 3, 1897, by EDWARD A. RIX, M. Am. Soc. M. E.

On March 19, 1897, W. Hampson, of Glasgow, Scotland, announces that he has succeeded in liquefying air commercially, at a pressure of eighty-seven atmospheres. A telegram in one of the New York papers, about April 1, 1897, announces that Prof. Linde, of Germany, has succeeded in liquefying air commercially and producing it at a very small price per cubic foot. How long previously to the announcement of the success of these experiments these gentlemen had perfected their apparatus, I know not, but I believe that Mr. Charles E. Tripler, of New York, more than twelve months ago, and possibly longer, succeeded in accomplishing the same thing. Probably to him is due the honor of being the pioneer in this proposition. The secrecy which was imposed upon me when I first witnessed these experiments has by special request, and for the purpose of this particular occasion, been somewhat lightened and I am permitted to speak in general on the subject.

I look upon the commercial production of aerine as a very important discovery, and I think the future question of economy in motive power is intimately associated with this liquid.

Compressed air, at pressures ranging from 1000 pounds upwards, is conducted from an air receiver through a small pipe, is refrigerated to expel its moisture, and is then conducted into the apparatus which liquefies it completely, without the use of chemicals of any kind, and it flows from this apparatus in a stream about the size of a lead pencil (in the apparatus which I saw) into a glass insulated receptacle containing about two gallons. I saw this receptacle filled in a very short time. Of course, being in an open vessel, aerine has no pressure, but its temperature is approximately —385° Fahr., or 445° below the atmosphere at 60° Fahr. Inasmuch as it is boiling rapidly on the surface, owing to its absorption of heat from the atmosphere, it looks like carbonated milk on the surface, but upon dipping some of it out in a glass, and observing its color through a glass, it has very much the appearance of ordinary water and about the same weight. Its temperature is very deceptive, for as it runs from the condenser one may allow it to trickle over the fingers for a short space of time and it appears to have the atmospheric temperature. The truth, however, of the matter is that it does not come in contact with the fingers at all. The hand being something like 480° warmer than the liquid, it throws the liquid into a spheroidal state and interposes between it and the finger a film of atmospheric air. The sensation is very much like pushing one's hand into a bag of feathers or into a mercury bath, allowing, of course, for the difference in weight between the mercury and the aerine. If, however, you immerse your hand in the liquid a sufficient time to establish contact, the flesh would be burned, the same as if it were exposed to 440° of heat measured above the atmospheric temperature. If a test tube of 1½ inches diameter, having a couple of pounds of mercury in the bottom, is immersed in aerine, the mercury will be frozen solid in a few seconds and may be hammered out and otherwise manipulated, the same as lead.

An alcohol thermometer of large size will be frozen instantly upon being immersed in the liquid.

An idea of the tremendously low range of temperature may be gathered from the fact that it will take several minutes to thaw out the small bulb of this thermometer, by covering it with the palm of the hand. That is one of the peculiarities of these substances, which I noticed at these low temperatures, that the surfaces of these frozen substances were not sufficiently large to absorb heat fast enough to restore their condition, excepting after a considerable length of time.

A tablespoonful of aerine poured on about a fluid ounce of whiskey will freeze it at once into flat scales, giving the whole the appearance and color of cyanide of potassium. This may be emptied out on the table and will remain frozen in that condition for fully five minutes.

One thing which impressed me was that while molecular motion was practically arrested at this temperature, the odor was perfectly distinct, showing that these particles which stimulate the sense of smell are actively independent of the temperature.

A teacupful of aerine poured on top of a tank of cold water goes into its spheroidal state instantly, in globules of about half the size of an ordinary marble, which fly around on the surface, leaving a trail of white vapor behind them.

A handkerchief of either silk, linen or cotton, saturated with the liquid, will be charred and destroyed just the same as if it were put in an oven and browned, though no change of color is apparent. Its evaporation is quite slow and it may be carried about for a number of hours in an open vessel without entirely disappearing. It probably represents a compression of about 700 atmospheres and would therefore in a confined space, and at 60° temperature, represent a pressure of somewhere from 10,000 to 12,000 pounds to the square inch.

Of course, it is rather disappointing to have our ideas of absolute zero completely upset. While we have always appreciated the fact that it was a purely theoretical conception, and while it was perfectly possible to think of a point where air would have no pressure, it was not possible to think of its having no volume. Still, not being able to prove to the contrary, we have accepted the absolute zero as a possible reality. Of course, this has all been based upon the proposition that air was a permanent gas. In experiments, however, of the kind that I have just alluded to, we find that at a temperature of —385°, air changes its physical state, yields up its latent heat and becomes a liquid, bringing into play a new series of phenomena, which are not at all consistent with the equations which we have depended upon. At about —425° it becomes a solid, after which we know of no means of further changing its state; so that —461°, the absolute zero, is an impossibility, both in conception and realization.

Just what aerine has to do with thermo dynamics, I must leave you at present to conjecture, for I am not permitted to say; but I know of some, and look for many other, remarkable developments.

For transmission purposes, there seems to be no reason why aerine should not be pumped through an insulated pipe, the same as water. When this becomes possible, the diameters of pipes to transmit large horse powers would be exceedingly small. For instance, inasmuch as one pound of air will yield in properly reheated engines about 1.6 H. P., 1000 H. P. would require 620 pounds of air, or aerine, per minute. This 620 pounds would occupy a space of but 10 cubic feet. The transmission pipe, then, would have to convey 10 cubic feet per minute. Let us say the transmission is for five miles. It is easy to calculate from ordinary hydraulic formulæ that a 3-inch pipe would convey this power with a pumping pressure at the point of supply of 200 pounds. The only pressure which the pipe would have to resist would be the pumping pressure; consequently, ordinary gas pipe or tubing could be used, the cost of which, together with its insulation, would be an insignificant figure in comparison to the horse power it would transmit.

A WORKMAN in a cutlery factory in Sheffield, England, has recently made a dozen pairs of shears, each so minute that they all together weigh less than half a grain. That is about the weight of a postage stamp. Each pair was perfect and would cut if sufficiently delicate material could be found. Lying on a piece of white paper, they seemed no larger than fleas.

The Limitations of Government in Water Power Plants.

By MARK A. REPLOGLE, Engineer.

The first part of this article appeared in the issue of June 5, discussing the regulation of the speed of a water wheel in a power plant. The following is the second and concluding part:

"Capacity of plant for stored energy," the third element to be considered in the government of water power, is perhaps the most important factor, and often receives the least consideration. It is too often a chance factor. The capacity of the plant for stored energy may be easily understood. The following comparison partially illustrates the idea: To reduce the walls of a fortress may require a gang of laborers to use their united energy for several months of time, yet a few hundred pounds of steel in the form of a projectile fired from a cannon can in an instant be charged with energy enough to carry it a number of miles, and at the end of its flight it yet may retain power enough to reduce the fortress in a moment of time. This principle of storing energy in material in motion is the fundamental principle of all speed government.

If the above cannon ball were forged into a flywheel, and could be revolved on its axis with such rapidity that its average speed equaled the velocity that it had when fired from the cannon, it would contain the same quantity of energy, and this quantity might amount to many thousands of foot-pounds per second. In speed regulation this stored energy can be used to supply the demands for power until gravity can generate it. In like manner this capacity for energy storage can absorb power when the load has decreased until the power supply can be cut off. It can readily be seen that any and all of the moving or revolving parts of a power plant are storehouses for energy, and their capacity depends upon their weights and velocities. The physical laws governing the quantities of energy under the various conditions are well understood by our scientists and engineers, hence advantage can be taken of them in the construction of our modern water power plants.

The careful steam-engine builder has learned by experience that he must provide this power-storage capacity in his engine, and he varies it according to what is required of it in government. There is no doubt but that the use of flywheels on engines is a result of experience in trying to maintain even speed, and that their prime purpose is to carry any change in load until the power supply from the boiler can be brought into play to carry the new load, and to supply the power that the flywheel gave out in advance of it. The time required to get gravity effects is always greater than the time required to get the expansive effects of steam; therefore, the capacity for power-storage should be correspondingly greater in water powers if the same efficiency of regulation is required.

The momentum of water power plants is often very much less than that of steam power plants, and this lessens the possibilities of government to an extent determined by the changes in the load, the time required for gravity to act, and the quantity of power stored in the moving parts of the plant. This factor, power storage, cannot be too carefully considered. It is the factor above all others that the designer of a water power plant can most easily control. It is the one factor that can be varied to counteract all the bad effects of all the others; therefore, an intelligent application of it should be made in all water power plants where good government is important.

The last factor to be considered is the "governor." The governor is often considered to be the most important factor in the government of a water power; but it is only one of the important factors, and, if it is a perfect machine, it may still be limited in its efficiency by the three above discussed factors. A good governor can only play the part of an honest judge: Evidences of strife in the form of changes in load are placed before it; facts of design and construction are placed at its disposal; the unerring laws of physics are brought to bear upon each new case, and honest judgment is meted out in the form of speed or government of the plant, and no jury or supreme court can set aside the verdict.

A good governor must move the wheel gates as fast as gravity will respond in giving the proper velocity to the increased quantity of water required to supply the demand made for power. If it operates too fast, the results are detrimental to good government. The governor must have wrought into it the principles that co-operate with the power storage of the plant. It must be so designed and constructed that it will stop moving the gates when they have reached the proper position to supply power for the new condition of load. A good governor must make its judgments quickly and accurately, always returning the speed to normal after correcting the inertia and momentum effects of the change in load. A good governor should also be simple in design and mechanism; otherwise, it will be an expensive and unsatisfactory part of the plant. The constant and reliable duty expected of a governor requires it to be a powerful machine; the positive and quick judgments it must make requires it to be sensitive and delicate in some of its parts, and the importance of its position in a plant requires it to be symmetrical in appearance and mechanically perfect in its construction.

The possible regulation in a water power plant need no longer be a matter of experiment and doubt. The designer of such a plant need no longer be in darkness as to the government of his plant until he has experimented with several governors. He can design his plant for any desired efficiency of regulation, and a properly designed governor can govern it.

All plants already built are capable of a certain degree of regulation. If this degree is not satisfactory, and figures show that it cannot be improved, then further calculations will show positively what changes must be made in order to obtain the desired results.

In conclusion, it should be said that if the limitations of water-power government were investigated more carefully, there would be less doubt about the possibilities of government, and no doubt concerning the results in any particular case. Many of our conservative engineers who have not taken time to make these investigations have still some doubts regarding reliable and automatic government of water powers; but the results where these limitations have been intelligently calculated and the proper remedies applied, prove beyond all doubt that any desired efficiency of government can be provided for, even to the finest steam engine practice.

IN a report to the State Department Consul Monoghan, at Chemnitz, Germany, says that a new invention has been brought out in Berlin and Leipzig, to be known as iron felt. It is made of the best woolen materials, impregnated with the inventor's patented preparation, which gives it a 2220 pounds power of resistance to every square centimeter. The article is most useful for railroads of all kinds. Placed between the rails and sleepers it deadens sound, prevents shocks, and consequently lessens the wear and tear on the road. The first experiments with the new material were made on the Berlin street railway, over which 360 trains pass daily. The results surpassed the company's most sanguine expectations, and persons living along the line of the road were delighted. Not only was the noise brought down to a minimum, but the wear and tear is materially diminished; hence the cost of running the road is considerably re-

duced. This new material is to be tried on the new roads that are now being constructed in Leipzig. Old buildings and buildings of stone and iron suffer most from the shocks and noise of passing trains. Where these are, such an isolated material is a necessity. The material seems to be specially adapted for elevated roads.

Scientific Progress.

New Uses of Aluminum.

The use of aluminum in the arts does not grow in proportion to the reduction in the cost of the material. A few years ago the price of the metal was from $10 to $15 a pound. It is now sold at 32 cents a pound. At that price it is now cheaper than copper or brass for the same purpose, because for a given strength the weight is much less. The Chicago *Journal of Commerce* says the consumption of these metals in 1896 was: Copper, 156,000 tons; brass, 60,000 tons; aluminum, 650 tons. The producers of aluminum, in order to make a market for the metal, have been obliged to discover nearly all its uses, invent methods of handling it, and build the works for turning out the finished products. Thus far it has nearly displaced nickel in the arts, and it bids fair to eventually displace brass for most purposes, except where exposed to a heat of over 300°. It is largely used for cooking utensils and keeps bright. It is used in laboratories, and for the handles of surgical instruments, not only for its lightness, but because it is not affected by the antiseptics used. Dentists use it for plates for false teeth, and it has been used to replace a broken jaw. One of its latest uses is for lithographic plates, instead of stones, cheapening the process. In electric apparatus it is cheap on account of its non-magnetic quality. In Europe it is being used to reduce the weight of military accouterments—canteens, buttons, belt plates and the like being made of it. The anticipated output in 1898 is 2000 tons, and in 1900 10,000 tons.

A Railway Hospital Car.

Consul Morris writes from Ghent, that the latest novelty in Belgian railroad matters is the hospital car. In the event of a serious railroad accident, the car may be run to the spot, where the wounded may be picked up and carried to the nearest large city for treatment, instead of being left to pass long hours in some wayside station while awaiting surgical attendance. It also enables the railway companies, at certain seasons or upon special occasions, to transport large numbers of invalids to health resorts. The interior is divided into a main compartment, a corridor on one side, and two small rooms at the end. The largest compartment is the hospital proper; it contains twenty-four isolated beds on steel tubes hung upon powerful springs. Each patient lies in front of two little windows, which may be closed or opened at will. Each bed is provided with a little movable table and a cord serves to hold all the various small objects which the patient may need. The corridor on the outside of the hospital chamber leads to the linen closet and the doctor's apartment. In the latter is a large cupboard. The upper portion is used for drugs; the lower part is divided into two smaller compartments—one serving as a case for surgical instruments, the other as a receptacle for the doctor's folding bed.

The hospital compartment is carpeted with linoleum to deaden the sound of walking. Trap-doors in the floor, when opened, disclose an ice chest, a compartment for disinfection of soiled linen, and a provision cellar. If necessary, a portion of the hospital chamber may be transformed into an operating room for urgent cases.

REPRESENTATIVE JEFFERS has introduced a bill in the Pennsylvania Legislature similar to one introduced by Congressman Bingham in the House of Representatives, in which the latter asks that $25,000 be appropriated to the Franklin Institute of Philadelphia and the Purdice University of Lafayette, Ind., for the purpose of determining the quantity of the so-called "hammer blows, centrifugal lifts and tangental throw" of locomotive driving wheels in use on American railways. It appears that the unequal balancing of locomotives is the cause of the thumping and jarring which railway travelers find so inimical to their comfort and railway owners so injurious to their property. It is the hammer blows which bend, break or spread rails, which jar the roadbeds, tear out fastenings, fracture bolts, shatter bridges and cause so much loss of life and property. Railway accidents are sometimes caused in this manner. In the city's streets the hammer blows loosen the asphalt in which the rails are imbedded and entail not only an unsightly condition of the streets, but constant expense for repair and reconstruction.

Extent of the Universe.

On some aspects of the problem of the extent of the universe light is being thrown even now. Evidence is gradually accumulating which points to the probability that the successive orders of smaller and smaller stars, which our continually increasing telescopic power brings into view, are not situated at greater and greater distances, but that we actually see the boundary of our universe. This indication lends a peculiar interest to various questions growing out of the motions of the stars. Quite possibly the problem of these motions will be the great one of the future astronomer. Even now it suggests thoughts and questions of the most far-reaching character.

A STUDY of ozone from a technical standpoint, by E. Andreoli, appears in the *Journal of the Society of Chemical Industry*. Theoretically, one should be able to produce a kilo of ozone per electric horse power, but in practice only ten or twelve grams are obtained. By improvements in the apparatus for producing ozone, the author increases the production to thirty and even fifty grams per horse power, making the cost about 75 cents a kilo. The author proposes practical applications of ozone, such as purification of drinking water, cleansing of beer casks, preparation of wood for instruments and furniture, bleaching of starch and dextrin, oxidation of drying oils, purification of wine and brandy, etc. It does not appear, however, that any of those proposed uses have been tested practically and on a large scale.

"WHAT year was the electric light discovered and introduced, and in what country?" is answered in a contemporary as follows: Humphry Davy produced electric light with carbon points in 1800. Prof. Tyndall lectured at the Royal Institution, London, by the light of Jules Duboscq's electric lamp in 1855. The South Foreland lighthouse was illuminated by electricity in 1858, and the French Government ordered eight lighthouses to be so illuminated in April, 1861. In 1878 T. A. Edison of New York discovered a method of producing more light at less expense, and from that time the movement towards electric lighting rapidly advanced.

GLACIAL erosion is one of the most important methods of lake formation, and glacial deposition makes lakes on a smaller scale. A valley, having moraine material deposited at its lower end, will, when the ice sheet has disappeared, become the site of a lake if a stream flows there. With a glacier flowing past the end of a valley, the lateral moraines piled up will likewise form dams and thus lakes.

PROF. ALEX. GRAHAM BELL is now busily engaged in perfecting an instrument which carries words on the rays of light. He has already succeeded in telephoning by this means for a single mile.

Electrical Progress.

Calcium Carbide as a Reducing Agent.

Since the introduction of calcium carbide, it is significant that scientific men have been content to allow the product to rank solely as a water decomposer, and thus regard the production of acetylene the only available product. Researches of a somewhat lengthy description, which have lately been carried out at the Liverpool Research Laboratory, involve the use of calcium carbide as a metallurgical reducing agent.

In the first instance an excess of litharge was heated to redness in contact with the carbide, in a clay crucible, the reaction being accompanied by vivid incandescence, resulting in the formation of metallic lead and calcium oxide, CaO. A further portion was now selected, in which the proportion of carbide exceeded that of the litharge; this was further subdivided into various smaller portions, each portion being exposed to various temperatures, resulting in a regulus of calcium and lead of varying percentage, together with the expulsion of CO_2.

The alloys thus formed are all more or less brittle, and to a certain extent sonorous when struck, their melting point ranking below that of pure lead, and are slowly, but completely, decomposed in contact with aqueous vapor, the reaction being much less energetic than that afforded by alloys of lead with the alkaline metals. Stannic oxide, cupric oxide, and also ferric oxide, at corresponding higher temperatures, were readily reduced, yielding results of no practical value; in the case of the cupric alloys those samples containing under 1 per cent of calcium being rendered cold-short and breaking under very small strain; while, on the other hand, iron containing calcium approaches in appearance that of ferromanganese, being even more brittle, and very oxidizable in contact with water.

In a further operation, oxides of manganese nickel, cobalt and even chromium, molybdenum and tungsten were readily reduced, yielding calcium alloys. Results of experiments comprising the reductive action of the carbide upon the earthy chlorides and their haloids will be shortly at hand. The already partial success of these reactions seems to point most conclusively toward a new and powerful reducing agent, which at the same time, considering the market value of the carbide in question, could not fail to replace both sodium and potassium.—H. N. Warner in Chemical News.

The Direct Current Transformer.

The transformation of energy is at present, more than ever before, the main problem on which electrical and scientific men are working all over the world.

Viewing this subject from a practical standpoint, there are only two methods at present known which are worth considering.

One is using the storage battery. This necessitates a continuous-current source, or an alternating current rectified by means of a synchronizing commutator. The other is the magnetic induction method, which requires an apparatus in which either the conductor or the magnetic field is moving, as an ordinary dynamo, or a changing magnetic field set up by an alternating or pulsating current supplied to it. A transformer of this kind, having no moving parts, and requiring so little attendance, it has frequently been found preferable to use it, and to construct alternate-current machinery, giving a frequency best suited for its use. This is the only recommendation that can be given or assigned to the alternating current — the simplicity and cheapness of transforming it. In almost every other respect it is objectionable. It requires larger conductors than the direct current, and is more apt to produce all kinds of induction troubles in its own conductors and neighboring lines. The use of the alternating-current transformer is at present limited to electric lighting and to power transmission in connection with polyphase-current working.

The direct-continuous current is the ideal method for transmitting electrical energy, and it has advantages over the alternating current in almost all cases, and embraces a broader field, as, for instance, the operation of the telephone and telegraph systems which cannot at present be operated in any other way.

The objections to the direct current transformer are not so much questions of efficiency, as it is the first cost and running expenses. An apparatus having bearings, commutator and brushes, will necessarily cost more than one having only two coils incased in a stationary magnetic field.—C. Thorardson before the Chicago Electrical Association.

Overhead Trolley Without Wires.

An electric trolley system to be shortly introduced in Paris differs from that ordinarily employed in this country, overhead wires being dispensed with. The new system is the invention of Bochet, who establishes overhead contacts from the electric lamp posts belonging to the city, the distance between posts being somewhat smaller than the length of the electric train, consisting of two cars, so that contact is always assured at one point at least. Through flexible points of contact suspended from each electric light post along the proposed line the current will be taken up by means of a copper rail fastened along the edge of the roof of the car not less than 14 or 15 feet from the ground. The contact point will slide along that copper rail, and, it is claimed, there is no difficulty in establishing a continuous current if the points of contact are made sufficiently elastic. The current returns to the power station through the track as usual. This system claims all the benefits of the overhead as well as of the underground systems, without any of their shortcomings.

Electricity and the Growth of Plants.

It has at last been practically proved that electricity is a real incentive to the growth of plants. This is the result of experiments made at the Massachusetts Agricultural College by A. S. Kinney, an expert. He submitted different seeds to the action of an electric current, and found that germination was much accelerated. He took two lots of twelve groups containing 112 seeds each, soaked them in water until thoroughly moistened, and while wet placed them in glass cylinders open at either end. Copper disks which were connected at the poles of an induction coil were pressed against the seeds and a current passed through them for one or two minutes. After this the seeds were sown, the temperature being kept at 45 to 50 degrees. The result was an increase of growth in the seeds to which electricity was applied over the seeds not subjected to the experiment, of 30 per cent.

The result of the experiment showed that electricity exerts an appreciable influence upon the germination of seeds; that the application of certain strengths of current to seeds for short periods of time accelerates the processes of germination. Those lots of seeds receiving electrical stimulation gave a higher percentage of germination than the normal. The range in the strength of current which accelerates germination is exceedingly limited. Seeds subjected to but one application of electricity show the effect only for a few hours. Electricity when applied hourly to germinating seeds or growing plants does not lose its effect but acts as a constant stimulation to their growth and development.

THE visit of Professor Forbes to Egypt to inspect the natural water power of the Nile seems successful. He expresses a favorable opinion as to the utilization of the power of the Nile cataracts for generating electricity.

Motors and Pumps for Irrigation.

Some months ago we published accounts of the efficiency of wind power and windmills as a means of lifting water for irrigation. These statements came from the great interior arid regions and some of our California readers thought that they counted too much on the wind and on the windmill. We have now a careful statement prepared by F. H. King, University of Wisconsin, and would like to have these statements and estimates reviewed in the light of California experience.

Lifting Water by Wind Power.—At the present time there is much talk about the utilization of wind power for irrigation purposes, and where the areas to be irrigated are small, and particularly where the lift is very low, the windmill makes a cheap and effective motor for lifting water, but a single mill never can be depended upon to do work on a large scale.

As the windmill is at present used upon a piston pump, it will be helpful to consider what work can be done by piston pumps under different conditions, and in the table below is given the number of days required to pump the amount of water needed to irrigate one acre to the extent of two inches and four inches, respectively, with a single-acting piston pump working eight hours per day and making thirty strokes per minute:

NUMBER OF DAYS REQUIRED TO PUMP TWO AND FOUR ACRE-INCHES OF WATER WITH A SINGLE-ACTING PISTON PUMP WORKING EIGHT HOURS PER DAY AND MAKING THIRTY STROKES PER MINUTE.

Diameter of piston.	Time required to pump two acre-inches with—		Time required to pump four acre-inches with—	
	6-inch stroke.	12-inch stroke.	6-inch stroke.	12-inch stroke.
Inches.	*Days.*	*Days.*	*Days.*	*Days.*
3	20.5	10.3	41.1	20.5
4	11.6	5.8	23.1	11.6
5	7.4	3.7	14.8	7.4
6	5.1	2.6	10.3	5.1
7	3.8	1.9	7.5	3.8
8	2.9	1.4	5.8	2.9
9	2.3	1.1	4 6	2.3
10	1.8	0.9	3.7	1.9
11	1.5	0.8	3.1	1.5
12	1.3	0.6	2.6	1.3

It is claimed by Wolff that the average length of a day's work for windmills in the United States is 8 hours, and they are not likely to average more than 30 strokes per minute where single-acting pumps are used; and, this being true, the table above shows what the range of work done by the windmill may be when used for irrigation if worked upon pumps such as are indicated in the table.

It is generally conceded by the best authorities on the subject that existing data bearing upon the actual work which windmills are able to do when used for irrigation are not sufficient to enable tables to be constructed which will show what wheels of different pattern and sizes may be expected to do when set up in different sections of the United States. But if windmills can be set up which will work single-acting pumps at the rate and under the conditions indicated in the table above, then the areas to which 2 acre-inches and 4 acre-inches of water may be applied every 10 days would be as follows:

AREAS IRRIGATED BY WINDMILLS WORKING SINGLE-ACTING PISTONS 8 HOURS PER DAY AT THE RATE OF 30 STROKES PER MINUTE.

Diameter of piston.	2 inches every 10 days.		4 inches every 10 days.	
	6-inch stroke.	12-inch stroke.	6-inch stroke.	12-inch stroke.
Inches.	*Acres.*	*Acres.*	*Acres.*	*Acres.*
3	0.49	0.97	0.24	0.49
4	0.87	1.73	0.43	0.87
5	1.35	2.70	0.68	1.35
6	1.95	3.89	0.97	1.95
7	2.65	5.30	1.33	2.65
8	3.46	6.92	1.73	3.46
9	4.38	8.76	2.19	4.38
10	5.41	10.82	2.70	5.41
11	6.55	13.09	3.27	6.55
12	7.79	15.58	3.89	7.79

From this table it appears that if windmills can be constructed which will work pumps at the rates here assumed, areas varying from 0.24 acre to 15.58 acres may be irrigated at rates of 2 to 4 inches every 10 days.

Wolff gives a table in his work, "The Windmill as a Prime Mover," showing the capacity of first-class windmills for work in irrigation, which is based upon results actually attained in practice, and from this the following table is computed:

NUMBER OF ACRES A FIRST-CLASS WINDMILL WILL IRRIGATE 2 AND 4 INCHES DEEP EVERY 10 DAYS WHEN WORKING 8 HOURS PER DAY AND LIFTING THE WATER 10, 15, AND 25 FEET, RESPECTIVELY.

Diameter of windmill wheel.	Lift of 10 feet.		Lift of 15 feet		Lift of 25 feet.	
	2 inches.	4 inches	2 inches.	4 inches.	2 inches.	4 inches.
Feet.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
8.5	1.35	0.67	0.9	0.45	0.55	0.27
10	4.57	2.13	2.85	1.32	1.70	0.80
12	7.66	3.83	5.11	2.55	3.00	1.50
14	9.87	4.93	6.58	3.29	3.94	1.97
16	13.79	6.80	9.10	4.54	5.64	2.82
18	22.00	11.04	14.14	7.05	8.64	4.32
20	27.46	13.98	18.55	9.69	11.47	5.86
25	37.06	23.33	31.38	15.69	18.46	9.36
30	65.46	47.73	64.42	32.21	38.06	19.04

It will be seen that according to this table the largest area which can be irrigated to a depth of 4 inches every 10 days by a 12-foot wheel, lifting the water 25 feet, is 1.5 acres. It should be said in connection with this table, however, that with the improvements which are being made both in the construction of windmills and of pumps adapted to them, it is quite probable that considerably higher efficiency will be attained.

Lifting Water With Engines.—When it comes to lifting water with engines for the purposes of irrigation, the amounts so raised to considerable heights at a comparatively small cost for fuel become very great.

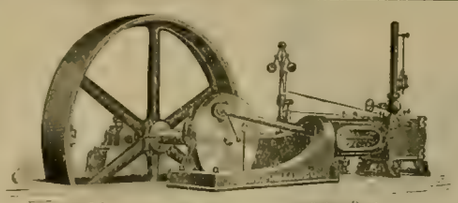
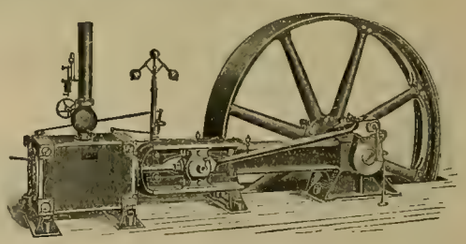
It is claimed that at the present price of gasoline the gasoline engines now made will produce 1 applied H. P. at a cost of 1 to 1.5 cents per hour for fuel. At the higher figure the water necessary to irrigate 1 acre to a depth of 4 inches could be lifted 20 feet high at a fuel cost of 14 cents, and if the irrigation were repeated six times the total cost per acre for fuel alone would be only 84 cents.

At the Wisconsin Station, with a rated 8 H. P. farm engine, water has been drawn from a lake through 110 feet of 6-inch suction pipe to a height of 26 feet at the rate of 22½ acre-inches per day, with 1 ton of coal. At $4 per ton for coal the fuel cost for 4 acre-inches lifted 26 feet high was 72 cents, which makes six such irrigations cost for fuel alone $4.32, or upon the basis of a 20-foot lift, $3.03. It should be stated regarding this case that the cost includes the waste of fuel incident to frequent stopping and starting to firing up in the morning and allowing the engine to cool down at night.

Some form of plunger pump is necessarily resorted to in wells where the water is more that 20 feet below the surface, and in using such pumps for irrigation purposes, especially where the driving power is limited, it is very important that the suction and discharge pipes shall have diameters nearly or quite equal to the diameter of the plunger itself, otherwise the loss of power through concussion, friction, and unnecessary velocity of discharge will be great.

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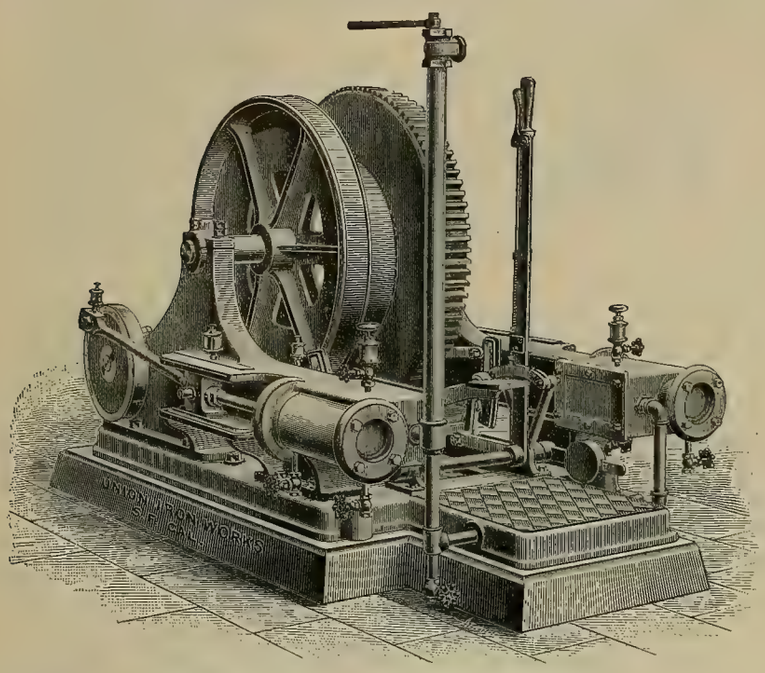
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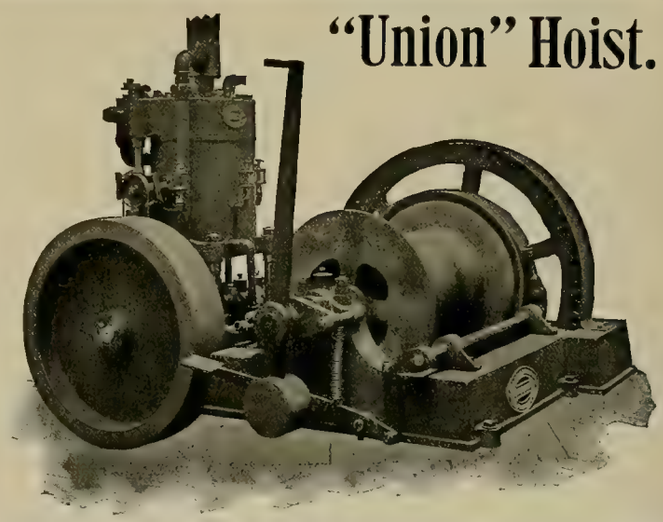
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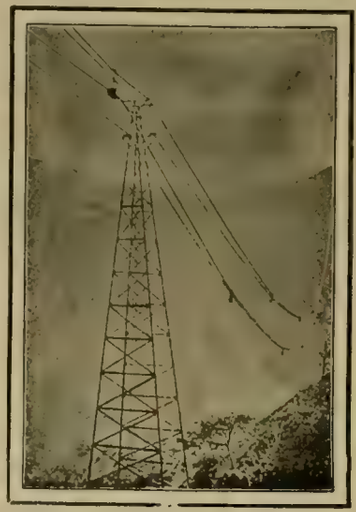
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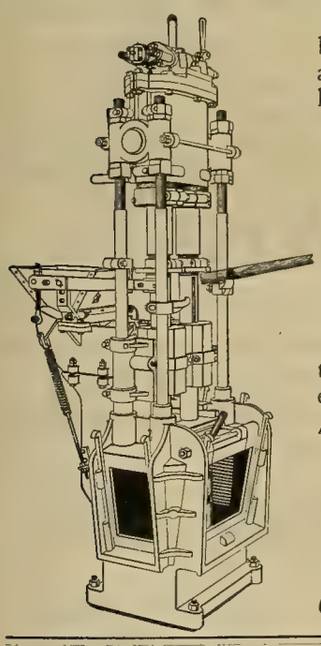
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Coast Industrial Notes.

—Oregon now proposes to make tea boxes for China.

—The San Joaquin Valley road is being extended to Visalia, Cal.

—The Nicaragua Canal Co. will shortly issue $15,000,000 5% bonds.

—The State Fair at Sacramento, Cal., will be held from Sept. 6 to Sept. 18, '97.

—A free market on the San Francisco water front will be established next month.

—Half a million pounds of wool were sold last week at Echo, Or., for 7 cents per pound.

—Another cut in Northern rates is reported, the fare now being $5 between San Francisco and Puget Sound.

—C. F. Juillard, of Sebastopol, Sonoma county, Cal., is about to ship 100 carloads of wine to New Orleans.

—Twenty cents per ton is the price paid for several thousand tons of tailings of the Good Hope mine, Perris, Cal.

—Eugene Debs talks of a scopy scheme —the building up of a new colony of communistic workers in the State of Washington.

—The Manufacturers' and Producers' Association will take a prominent part in the coming Fourth of July celebration in this city.

—The old scheme of an electric road from Marysville to Nevada City, Cal., is again revived, and local papers say surveyors are at work.

—According to a recent ruling of the Commissioner of Navigation, vessels propelled by gas, naphtha, fluid or electricity are classed as steam vessels.

—The Utah Central Railroad, running from Salt Lake to Park City, Utah, was sold last Wednesday to the Rio Grande Western Railway Company for $325,000.

—The British Columbia Development Company of Victoria proposes to build thirty-six miles of railway in central Alaska, with coast terminus at Skagaway bay.

—The California State Mining Bureau is going to prepare a register of mines and minerals of California, with maps of each county, location and description of mines, etc.

—The probability of the passage next month of a new tariff has rushed big cargoes of Oriental goods here. Four steamers in ten days have 20,000 tons freight from China.

—General Traffic Manager Eccles denies the report that the Oregon Short Line had opened the Butte gateway, which would allow the Great Northern and Northern Pacific railroads to compete with the Rio Grande, Western and Union Pacific lines for Eastern business.

—General Land Office Commissioner Hermann has issued an order regarding cutting timber on public lands under special permits from the Government. The former maximum of 2560 acres has been reduced to 160 acres, and sworn evidence is required in renewal of such permit.

—Surveyors at Kernville, Cal., are locating the route of a canal for the Los Angeles and Kern River Electric Company, which will head near Kernville and continue twelve miles to the power house. The transmission line as proposed goes through Tehachapi and east of Mojave.

—Among bids for three Government torpedo boats, to be of not less than thirty knots speed, are those of the Union Iron Works, of this city, for one 330-ton boat, $245,200, two, $490,500; one 284-ton boat, $225,000, two, $440,000. Wolf & Zwicker, of Portland, Or., bid for one 240-ton boat $214,500, two, $424,000.

—Cattle shipments through Albuquerque for 1897 to June 1 are unprecedently large. For the season to that date they numbered 166,872 head, all going north to feed or market. For May they numbered 105,191 head. The cattle are divided as follows: New Mexico and Arizona, 120,870; Old Mexico, 35,000; Texas, 11,000.

—It is expected that the Sonora railway, in Mexico, will be turned over to the Southern Pacific by the Santa Fe next week. The exchange of the line of Mexican road for the line between Mojave and The Needles was to have been made a month ago, but both companies have to await the permission of the Mexican Government to make the trade.

—Official statistics on the imports and exports of Japan show that the United States is now purchasing over $19,000,000 worth of manufactured articles and raw material a year of Japan, while that country is taking less than $5,000,000 worth of us. The British manufacturers are annually selling to the people of Japan about $20,000,000 worth of goods, while they are taking in return only $4,668,000 worth.

Book Notices.

The "Chlorination Process." By E. B. Wilson; octavo 120 pp. This little book is mainly a condensation of practical chlorination methods as successfully practiced in various sections, giving a description of the process, its cost and practical results. Considerable space is devoted to roasting-furnaces. Due credit is given G. F. Deetken, of Grass Valley, the first man to make a commercial success of the chlorination process in this country. A table of average cost is given, the figures not varying much from those previously published. The book is issued by Jno. Wiley & Sons., 53 E 10th St., N. Y. City; price, $1.50.

Recently Declared Mining Dividends.

Geyser — Marion, Utah, $9,000, payable June 30.

Personal.

J. P. Turner has been appointed superintendent of the Last Chance mine at Bingham,

A. B. Bowers has filed a suit against the Government for $500,000 for use of his patent dredger.

S. J. Eckman has been appointed superintendent of the Hexter mine in Calaveras County, California.

Charles A. Raymond has been appointed superintendent of the Grand Victory mine in El Dorado County, California.

Jas. Cronan, late superintendent Hale & Norcross, Virginia, Nev., is in the city on his way to Spokane, Wash., where he has mining interests.

Mr. Geo. E. Ames Jr., resident representative of the Union Iron Works in the City of Mexico, is in San Francisco on a brief business visit.

Mr. Bernard MacDonald, mining engineer of Butte, Montana, whose services have been engaged by a Canadian and European syndicate to find mining property for them in British Columbia, is now in Rossland, which will be his headquarters for a time.

The Plumas County Miners' Association has appointed a committee to further the objects of the association, as follows: A. B. White, Spanish Ranch; W. H. Leek, Crescent Mills; Geo. Standart, Greenville; R. A. Costar, Prattville; C. Lee, Butte Valley; Ed. Remick, Taylorville; F. B. Hosselkus, Genesee Valley; Julius Pauley, Mohawk; J. Nevill, Johnsville; T. L. Jones, Beckwith; Wm. Schuld, La Porte; E. M. Garnett, Hepsidam; W. T. Byers, Bucks Ranch; Joe Peppin, Granite Basin; G. G. Odneal, Rich Bar; P. Traynor, Cromberg; N. Mullen, Sawpit.

Commercial Paragraphs.

Dividend No. 24 of 25 cents per share has been declared on the capital stock of the Paraffine Paint Company, payable at its office, 116 Battery St., San Francisco, on the 29th inst.

The Risdon Iron Works have shipped to the Consolidated Gold Mines, of California, at Oroville, a Heine boiler weighing 50,480 pounds, to generate 350 horse power.

Smith and Irving is the new firm name of the assaying establishment, 128 N. Main St., Los Angeles, Cal. There is no change in the personnel of the firm, but simply a change of name.

The Edward P. Allis Co., of Milwaukee, Wis., have closed a contract with the Le Roi Mining & Smelting Company for machinery for their new 300 ton smelter. The outfit will consist of two 38x120 inch blast furnaces, one Bolthoff-Wethey calcining furnace, one 14x24 foot Reverberatory Matte smelting furnace, two No. 7 Connersville blowers, machinery for 300 ton sampling mill, Reynolds Corliss engine, boilers, etc., necessary for a complete and modern smelter, to be completed and working by Jan. 1st, '98.

The Jeffrey-Robinson Coal Washing System, which is manufactured by the Jeffrey Manufacturing Company, of Columbus, Ohio, is receiving much attention at this time from the coal operators in general. Its claims for superiority, efficiency and low cost of operation seem demonstrated in the many plants now in use. Among some of the recent orders for complete 400 ton washing plants are the following: Kansas and Texas Coal Company, mines at Huntington, Arkansas, Muddy Valley Mining and Manufacturing Company, Hallidaysboro, Illinois, The Chickamauga Coal and Coke Company, Chickamauga, Ga., and the Toms Creek Coal and Coke Company, of Pulaski, Va.

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Recent California Mining Incorporations.

Buckeye Mining Co., Forest, Cal.; D. Davis, E. McCormick, M. D. Morrison, G. Haskins, C. Hooper; capital stock, $60,000—all subscribed.

Golden Gate Mining Company, San Francisco; H. R. Wylie, F. W. Fowler, R. Ash, W. H. Eastland, A. Ellis; capital stock, $500,000; subscribed, $4100.

Tuber Mining Co., San Francisco; T. B. Pheby, H. Wadsworth, N. Stein, H. Dutard, H. H. Lynch, T. B. Bishop, J. B. James; capital stock, $10,000,000; subscribed, $8200.

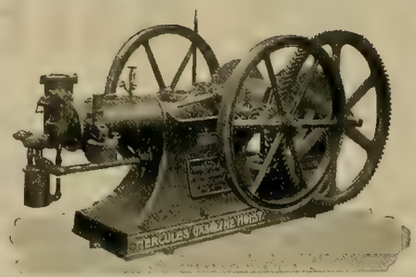
Jura Placer Mining Co., San Francisco; H. N. Thornton, W. Hacke, J. H. Marshall, J. P. White, W. Swarthy, San Francisco; capital stock, $200,000; subscribed, $50.

Harriman G. M. Co., San Francisco; C. S. Bluedict, F. W. Williams, M. B. Harriman, D. R. Oliver, S. C. Williams; capital stock, $1,500,000; subscribed $500.

Money Metal Mines Co., San Francisco; Messrs. Davis, H. McCormick, A. W. Coombs; capital stock, $500,000; subscribed $3100.

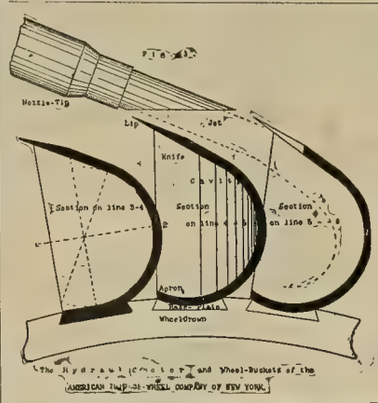
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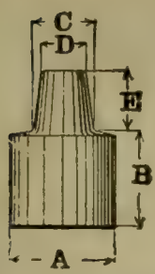


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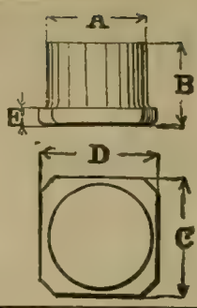
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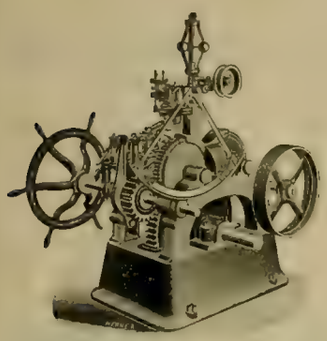
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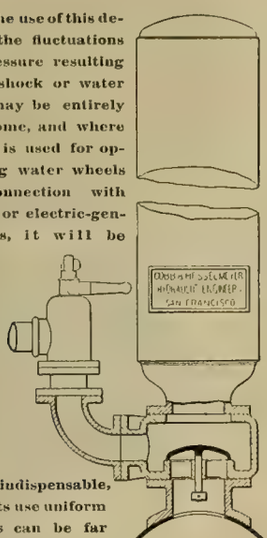
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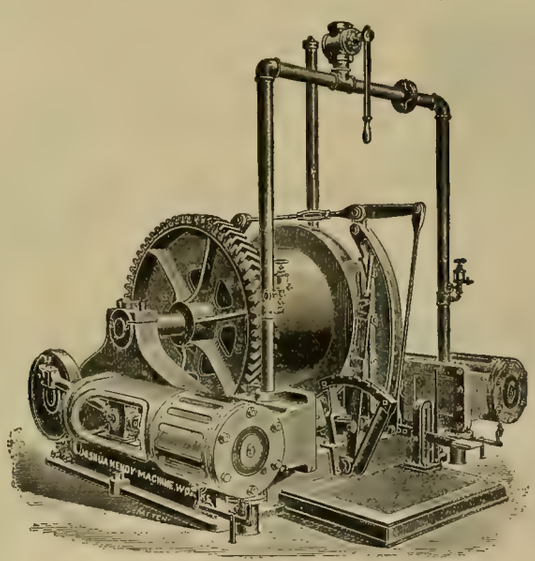
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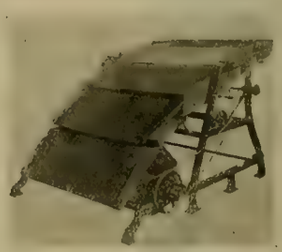
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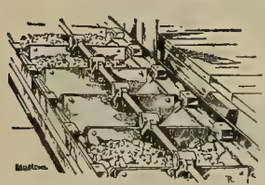
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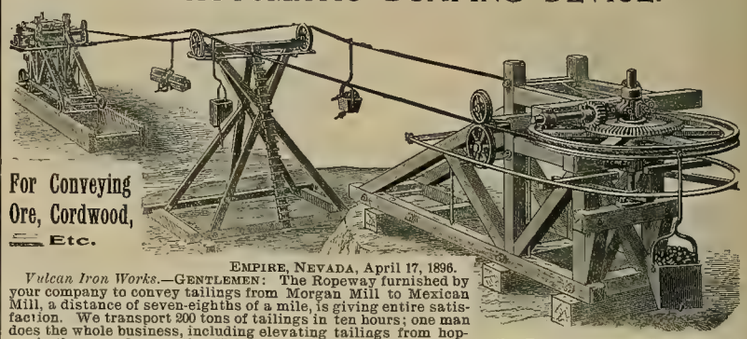
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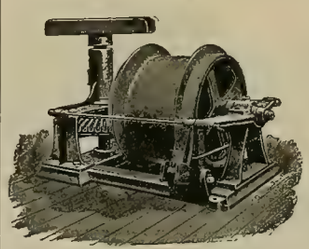
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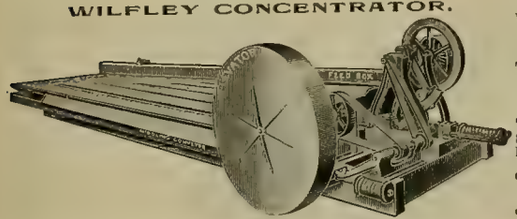
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[SIGNED] S. I. HALLETT.

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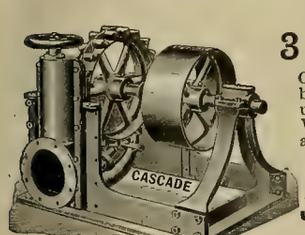
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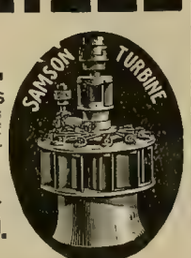
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Our experience of 33 YEARS building Water Wheels enables us to suit every requirement of Water Power Plants. We guarantee satisfaction.

Send for a Pamphlet of either Wheel and write full particulars.

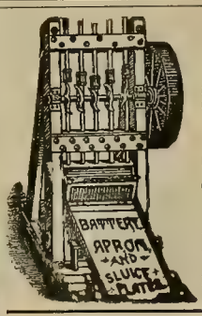


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For Heavy Mining Pump Buckets. Will outwear any other material and give best satisfaction. Samples furnished on application. A. C. NICHOLS & CO., Leather Manufacturers and Dealers, 404 Battery St., S. F.



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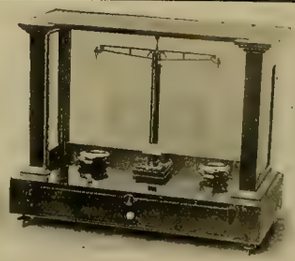
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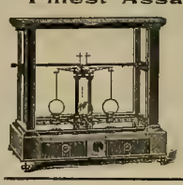
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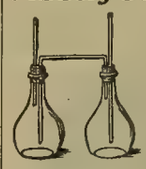
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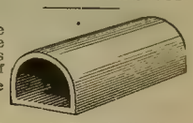


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C. C. McIVER, President; D. CUSHMAN, Secretary.
MISSION SAN JOSE, CAL., Oct. 17th, 1895.

RISDON IRON AND LOCOMOTIVE WORKS, San Francisco—Gentlemen: We take great pleasure in having to inform you that, after a careful investigation extending over a six weeks' steady run alongside of six other concentrators, the Johnston which you put in for us was the only machine from which you could not find a loss in the tailings. It has done all you claim for it and has proved more than satisfactory. We intend replacing all our other concentrators with Johnston's, as we are convinced they will pay for themselves many times over in a year. CHAS. C. McIVER, President.

THE FINLAYSON PATENT WIRE ROPE TRAMWAY.

THIS TRAMWAY IS THE BEST THAT HAS EVER BEEN PLACED ON THE MARKET. IT HAS NO RIVAL. IT IS STRICTLY AUTOMATIC AND ITS CAPACITY RUNS UP TO 1000 LBS. PER BUCKET. ANY ONE CONTEMPLATING THE ERECTION OF A TRAMWAY SHOULD INVESTIGATE ITS MERITS BEFORE PURCHASING ELSEWHERE. . . . . .

THE COLORADO IRON WORKS COMPANY, Denver, Colo.

SOLE AGENTS AND MANUFACTURERS.

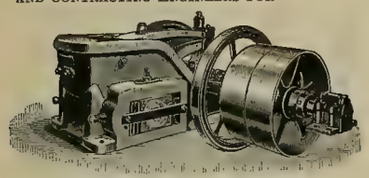
WE ARE MANUFACTURERS OF AND CONTRACTING ENGINEERS FOR

Gold, Silver, Lead, Copper and Pyritic SMELTING FURNACES.

AMALGAMATION AND CONCENTRATION PLANTS.

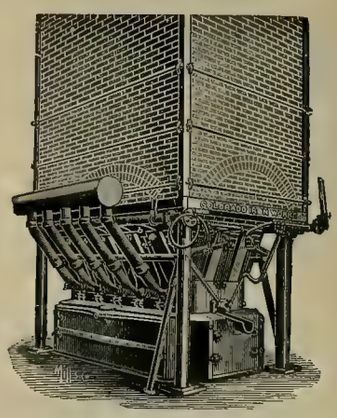
Investigate Our Late Improvements in ORE CRUSHING MACHINERY.

We Guarantee Capacity Per Day to Any Degree of Fineness.



Improved Black Hawk Ore Breaker.

OUR PATENT HOT BLAST APPARATUS for all Smelting Furnaces is a Success. A great economizer of fuel, and enlarges capacity of furnace.



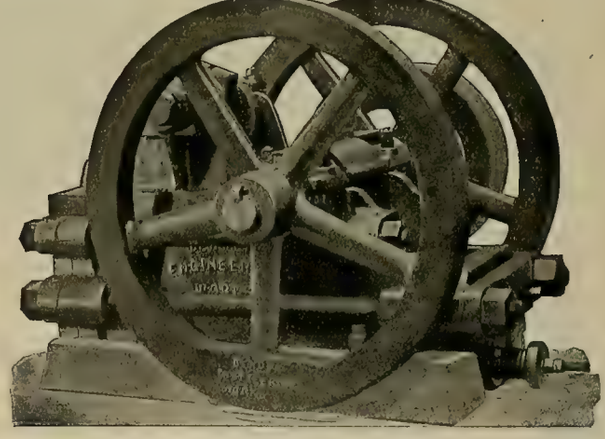
Standard Silver-Lead Water Jacket Smelting Furnace.

Equipped with Arch-Bar System of Mantles, insuring rigid and strong walls. No Cracks.

DENVER IMPROVED ORE CRUSHER.

Wrought Iron Tension Bars, Safety Toggle Plates,

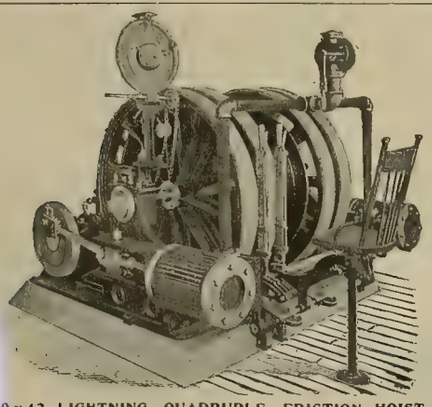
Increased Strength, Saving in Freight, Less Weight, Easily Transported.



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Denver Engineering Works Company,

DENVER, COLORADO, U. S. A.



10 x 12 LIGHTNING QUADRUPLE FRICTION HOIST.

The world does not require so much to be informed as reminded.—*Hannah More.*

We beg to remind you that our

LIGHTNING QUADRUPLE FRICTION HOIST

Has stood the test of years.

Workmanship and Material the Very Best.

SEND FOR DESCRIPTION AND PRICES. MENTION THIS PAPER.

HENDRIE & BOLTHOFF M'F'G CO.,

DENVER, COLORADO, U. S. A.

ESTABLISHED 1849.

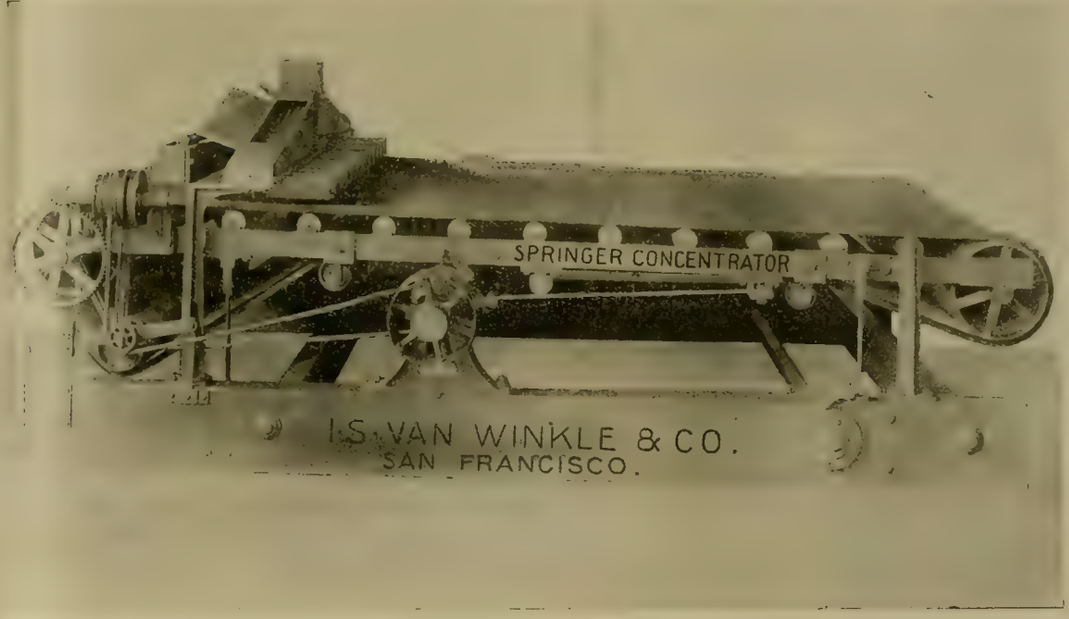
I. S. VAN WINKLE & CO.,

IMPORTERS AND DEALERS IN

Iron, Steel, Coal, Blacksmiths', Miners' and Mill Supplies,

413-415 MARKET ST., SAN FRANCISCO, CAL.

Daniel Best Crude Oil Engine,
Kinkead Quartz Mill,
Smith Striking Stamp Mill.



Springer Ore Concentrator,
Truax Ore Cars,
Rock Breakers, Hoists, Etc.

Why the Springer Concentrator is the Best:

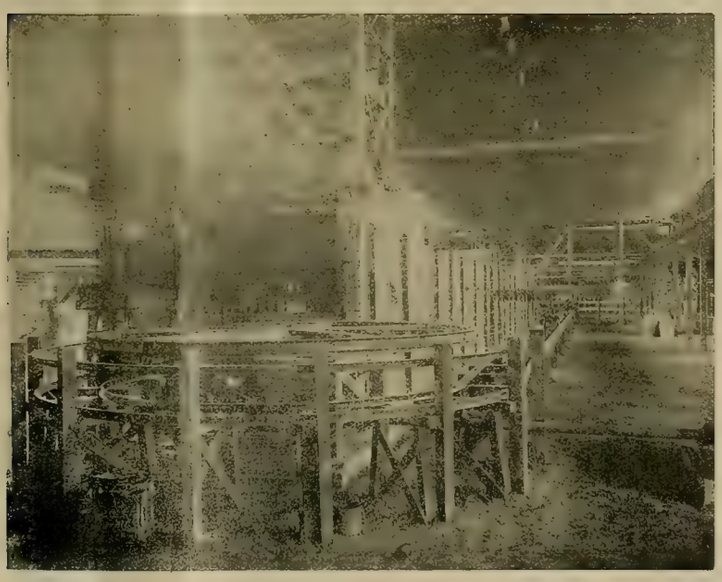
It will do more and cleaner work than any rubber belt machine.
It weighs only one-half as much as some of the six-foot concentrators.
Is the most simple in its construction of any machine in the market, and only one-third as many pieces in it as in some of the others. Was invented by an old miner of forty years' experience handling every known concentrator on the market.
Should any piece need repairing, it can be removed without disturbing any other part of the machine.
Can be set up by any inexperienced miner.
Its distributor is perfection itself, distributing the pulp evenly over the entire surface of the belt.
Grade of shaking frame can be changed while the machine is running at full speed.
It is the strongest, lightest running and most inexpensive to keep in repair of any
Will save more of the fine slimes than any other machine.
Is cheaper than any other six-foot machine, costing only $350.00 f. o. b. cars or boat, San Francisco.
Will handle the pulp from five stamps better than any other Concentrator.
Has adjustable eccentrics, and any length of stroke can be had, thereby giving different speeds per minute.
The belt is very durable, being made of No. 3 Canvas, woven especially for the Springer concentrator.
This machine requires so little attention that one man will easily attend to a dozen of them.
It has a solid rubber flange, which no other canvas belt has.
Wear and tear upon this machine is not one-third as much as upon some of the other concentrators.

Fulton Engineering and Shipbuilding Works.

Improved Mining and Milling Machinery

OFFICE AND BRANCH WORKS:

213 FIRST STREET, - - - - - - - - - SAN FRANCISCO, CAL.



PERSPECTIVE VIEW OF FURNACE.

PARKE & LACY CO.

21 & 23 FREMONT ST., SAN FRANCISCO., CAL.

Mining Machinery & Supplies.

Sole Licensee for the Manufacture and Sale of the

ROPP STRAIGHT LINE FURNACE

FOR ROASTING, CHLORINATING AND DESULPHURIZING ORES.

Extracts from Letters Received from Mr. Philip Argall, Manager the Metallic Extraction Co., Cyanide, Colorado:

January 2, 1897.

"The roasting is invariably good. We can do 80 tons per day to 0.13% sulphur, when everything runs smooth. Our month record which, of course, includes all delays, is 1700 tons, from 1.94% sulphur to 0.16%."

February 19, 1897.

"Our furnace is now running very nicely indeed, averaging 90 tons per day to 0.10% sulphur, and doing excellent work; in fact, it has improved right along and we are highly pleased with it.
"For 24 hours ending 7 A. M. to-day 102 tons were roasted."

The ROPP FURNACE is now in successful operation at the following reduction works: The Hanauer Smelting Works, Salt Lake City, Utah (one furnace); The Metallic Extraction Co., Cyanide, Colo. (one furnace); The Colorado-Philadelphia Reduction Co., Colorado City, Colo. (three furnaces); The Selby Smelting & Lead Co., Selby, Cal; (one furnace); The Mount Morgan Gold Mining Co., Rockhampton, Queensland (one furnace); and Broken Hill Proprietary Co., Broken Hill, New South Wales (two furnaces).

Catalogue on Application.

Market Reports.

The Markets.

SAN FRANCISCO, June 26, 1897.

The local money market begins to show signs of easing, with more outside money offering. The impression grows that in view of the steadily growing feeling of confidence, lower rates of discount will rule within the next 60 or 90 days, owing to banks letting out their hoarded stock of coin. So far the inquiry for funds does not show any increase, but it is expected that next month there will be a good demand for crop moving purposes. The crops of all kinds, except hay, are turning out larger than has been estimated, which will call for more money. The East reports a growing demand for money, which is accepted as a harbinger of better times. The call comes from speculators, manufacturers and merchants, and also for crop moving purposes.

The between-season dullness continues in about every branch, except groceries and other necessities. Jobbers in these branches report a fairly active demand, but with the margin of profit in many lines wiped out by close competition. In hardware, metals, etc., the demand is fairly active. We are creditably informed that three of the largest iron and machine works in this city have work ahead which will run well into next year, notwithstanding they are employing a largely increased number of hands. One harvest machine manufacturer reports more work than for several years, which gives employment to nearly double the number of men that were working for it last year. This speaks well for more prosperous times. Our Eastern exchanges are no longer pessimists, but are quite enthusiastic over the outlook, and unhesitatingly state that we have rounded the corner.

New York Silver Prices.

NEW YORK, June 24.—Following are the closing prices for the week:

	Silver in London.	Silver in N. Y.
Friday	27¾	60½
Saturday	27⅝	60¼
Monday	27 9-16	60⅛
Tuesday	27 9-16	60⅛
Wednesday	27 9-16	60⅛
Thursday	27 9-16	60¼

	Copper.	Lead.	Iron.	Tin.
Fri.	10 90 @11	12½ 3 37½	10 00@12 50	13 92½
Sat.	10 90 @11	12½ 3 37½	10 00@12 50	13 95
Mon.	10 90 @11	12½ 3 37½	10 00@12 50	13 95
Tue.	10 90 @11	12½ 3 37½	10 00@12 50	13 95
Wed.	10 90 @11	12½ 3 37½	10 00@12 50	13 95
Thur.	10 90 @11	12½ 3 35	10 00@12 50	13 95

The local bullion, money and exchange quotations current are as follows:

Commercial Loans, % per annum	7@8
Commercial Loans, prime	6@8
Call Loans, gilt edged	6@7
Call Loans, mixed securities	7@8
Mortgages, prime, taxes paid by lender	6@8
New York Sight Draft	17½c Prem
New York Telegraphic Transfer	20c Prem
London Bankers' 60 days	$4.87
London Merchants	$4.85
London Sight Bankers	$4.88
Refined Silver, per oz., 1000 fine	60⅛
Mexican Dollars	49@49½

SILVER.—The market shaded off slightly the past week in sympathy with the East. Europe continues to take sparingly, but if China should negotiate for a loan of $80,000,000, it is thought that a large part will be taken in silver, particularly if the money is for home use. The export movements from the port of New York have been largely of foreign silver, chiefly that imported from Mexico. The steamer for China took out for Japan and China 152,000 ounces.

MEXICAN DOLLARS.—The market is quiet, although steamers now leaving for China take out increasing quantities. The last one took out 166,721 dollars.

QUICKSILVER.—The market is steady to firm, with a continued fair demand.

Our market is quoted at $40.50 for domestic consumption.

COPPER.—The market has held steady. There have been liberal receipts of ingots the past week. The East reports a firm to strong market. James Lewis & Sons of Liverpool report in their last circular: "Less American copper is now offering than for some time past, and a considerable quantity of electrolytic and wire bars previously sold have recently been bought back by the original vendors. There are signs of improved trade in the United States, and as soon as the present session of Congress ends this improvement is expected to further develop. The demand for manufactured copper is not very active, and India has only bought small quantities of yellow metal and sheets. Best selected is becoming scarce. Birmingham is being offered. The use of high conductivity wire continues to extend both in this country and on the Continent, and wire drawers are busy."

The local market is quoted as follows:

Ingot, jobbing	—@14
Ingot, wholesale	—@13
Sheet copper	—@17
Bolt	¼ and 5-16, 20c; ⅜ and larger, 17

TIN.—The consumption continues large of both plate and pig, but this does not affect values owing to requirements having been met by forward purchases some time ago.

We quote as follows in a jobbing way:

Pig, per lb	—@ 15
Plate, I C coke, heavy, per box	$4 10@4 25
" " light, "	4 00@—

LEAD.—The market holds to strong prices with a fairly free consumption reported on this coast and also at the East. Foreign markets are firm to strong.

Our market is quoted in jobbing lots as follows:

Pig	4 00	@	4 25
"	—	@	4 50
"	5 62½	@	6 12½
"	4 87½	@	5 37½

SHOT.—The market is firm at full figures. Our market is quoted as follows:

Drop, sizes smaller than B, per bag of 25 lbs	$1 35
Drop, B and larger sizes, " "	1 60
Buck, Balls and Chilled, do, " "	1 60

POWDER.—The consumption shows an increase over last year. There was sent to Hawaii the past week 150 cases and 150 kegs.

The market is quoted as follows for Hercules: No. 1, from 11¾c to 17¼c, according to strength and quantity; No. 2, from 9c to 11c, according to strength and quantity.

BORAX.—The market is steady to firm. The market is quoted as follows:

Refined, in carload lots, in barrels	5
Refined, in carload lots in sacks	4¾
Powdered, in car lots	5
Concentrated, "	4½

IRON.—The market is firm to strong for all kinds. The East continues to report an active market, with sales made into next year. The consumption is larger than for years.

	To Arrive.	Spot.
AMERICAN.		
Sloss	$20 00	$22 00
Thomas	21 00	22 00
Salisbury	29 00	31 50
ENGLISH.		
Barrow	$21 00	$23 00
Gartsherrie	21 50	23 00

COAL.—There is nothing new to report in our market. The consumption of steam is increasing.

COKE.—The market is quoted as follows:

Gas Companies'	— —		— —
English, to load	9 50	@	— —
" spot, in bulk	10 00	@	— —
" in sacks	11 00	@	12 00
Cumberland	— —	@	— —

PLATINUM.—Very little doing.

Our market is quoted in a jobbing way at $10 to $15 per ounce.

ZINC.—The market is firm at quotations.

Our market is quoted at 10 to 15 cents, according to thickness.

ALUMINUM.—The market is steady.

We quote in jobbing lots at 50 cents per pound for ingots.

Chemicals.

There is absolutely nothing new to report. The long dragged out action on the tariff has admitted of the markets on this coast, and at the east being well stocked up, and consequently dealers fear there may be a selling pressure before the close of the year, which makes them conservative.

SPELTER.—The market is quiet but steady.

We quote our market in a jobbing way at 5 cents a pound.

BISMUTH.—The market is steady.

Our market is quoted in a jobbing way at $1.50 a pound.

PHOSPHORUS.—The market is steady.

We quote in a jobbing way at 70 to 75 cents per pound.

BONEASH.—There is nothing new to report.

Our market is quoted in a jobbing way as follows: Extra, 4c a pound; No. 1, 3½c; No. 2, 2½c.

SODA ASH, 58% (LeBlanc process).—The market is steady at $1.55 per 100 lbs. in a jobbing way.

CAUSTIC SODA, 60%.—The market is slow at 3c per pound in a jobbing way.

HYPOSULPHATE OF SODA.—There is a slow demand at 2½c a pound from stores.

NITRATE OF SODA.—Market is quiet.

Our market is quoted from store at 4c for 95%.

ACETIC ACID.—The market is steady at 6 to 12c per pound from store for carboys, according to make.

SULPHURIC ACID.—The demand is light.

We quote in a jobbing way at 1½c per lb for 66%.

NITRIC ACID.—Our market is reported steady from store at 6½@7c per pound in carboys.

BLUE VITRIOL.—Our market is quiet.

We quote in a jobbing way at 4½c per pound.

Mining Share Market.

SAN FRANCISCO, June 24, 1897.

The mining share market has been dull throughout the past week with a steady shrinking in values. This is contrary to reports put out last week that before July 4 there would be a strong up-move with many of the shares more than doubling on the shorts. It is quite likely that these reports caused persons on the short side to fill and as the majority of persons dealing in the market were loaded up there was no support. It seems to be a recognized fact that at the declining prices of the past few weeks there has been a steady absorption of the shares thrown out by the public. It is stated that strictly commission brokers have fewer shares for outsiders than ever before known. It is also said that the number of shares held on the outside, and paid for, is very considerable below that ever before held. These low holdings cause the inquiry to be raised "who has been buying them?" Experience has taught that it makes little difference if an inside pool holds the large bulk of shares, for they will not make a deal until they are ready. When they are ready and prices have been materially advanced and there is an opportunity of making a deal then a body of ore is shown up in the leader with the usual results, the outside heavy buyers at high prices on big ore developments, but later on they are big sellers on assessments and a petering out of the ore.

The news from the Comstock mines, so far as official letters placed on file are concerned, is devoid of interest. Some of these letters appear to be made to order, for, more than once, one or more of them have been at variance with what the inside pool has been furnished. Even officials of the mines and members of other pools, but not of the inside pool, are kept in ignorance of the true condition of the mines, when, by so doing, the "inside" is able to better accomplish a desired purpose. With persons claiming to be informed on the mines there is a strong belief that two or more good sized bodies of ore can be removed at any time desired. While believing this they do not operate in shares, well knowing that the mines are one thing and the stock market quite another, yet, out of both, money is made by the inside. From the north end group mines the news from there is of an interesting character to miners, but to outsiders it is of no particular interest. Some of the work is being run in the right direction, yet fears that it may be stopped, as has work for several years past, before reaching an ore body, keep informed outsiders from buying. In Utah work is confined to the surface tunnel level, with nothing new to report. In Sierra Nevada work is continued on the surface tunnel level and also 900-foot level. So far as official letters go, nothing of interest is reported, but Comstock miners state that the work in the 900-foot level is in the right direction. Probably this is why the shares have ruled strong. Nothing new comes to hand from Union. Official letters do not report quite so much active work. In Mexican they are still running a south drift from the northwesterly workings on the 1000-foot level. The material is not of an encouraging character. Long-suffering outside shareholders of Ophir ought to feel in better spirits, for the last official letter states that quartz assaying $1 a ton has been found in the mine, but this is not sufficient to shut off an assessment soon.

In Andes they are still exploiting the 175-foot level. The work in Con. Virginia begins to lose interest owing to a strong dropping in prices. The market value of the shares now with over 100 tons of good ore raised every week is not so high as it was when no ore was found, and only fair prospects ahead. In this mine active work is being done on the 1000-foot, 1550-foot, and 1650-foot levels. On the latter two levels the work is quite interesting, for the latter show that the mine is far from being worked out, and that when the work is in better shape more ore can be extracted than is now. At several places veins varying from a few inches to 2 or 3 feet have been cut, giving assays from $15 to nearly $100 a ton. The work in Best & Belcher, and Gould & Curry, is in the same direction, and on the same level heretofore reported. In the Alpha they continue to make slow progress about as fast as ever. Only 10 feet was made the past week in the south drift from the west crossdrift on the 500-foot level. This drift is being run so as to put the mine in position for better working when desired by the inside. In Bullion they have abandoned the work that they have been doing for months past, and are going to run an east crossdrift from the work shaft. The joint west crossdrift of Con. Imperial, Challenge and Confidence is in harder material. From Confidence nothing of interest is at hand. The work is the same as reported last week in the Crown Point, Belcher, Seg. Belcher and Overman. In the joint west crossdrift of the Yellow Jacket, Kentuck and Crown Point, only fair progress is being made. Nothing new comes to hand from Alta.

From the Bruswick lode nothing of particular interest has come to hand. The last official letter from the joint work of Con. Virginia, Best & Belcher and Gould & Curry state that in the Best & Belcher ground they ran into one foot of ore assaying a little over $39 a ton, and that 15 tons of ore had been extracted. If with over 2000 tons of good ore extracted last week by Chollar an assessment has to be levied, the one-foot ore in B. & B. is not very encouraging. In Chollar they are pushing work on the 300-foot, 400-foot, 500-foot and 600-foot levels. There was extracted last week 226 tons of ore assayed by battery samples $13.22 gold and 13.02 ounces of silver to

MINING ASSESSMENTS.

Company and Location.	No.	Amt.	Levied,	Delinq't and Sale.	Secretary.
Alta S M Co, Nev	56	5c	May 21	June 25..July 16	J E Jacobus, 309 Montgomery
Bullion M Co, Nev	50	10c	May 4	June 8..June 28	R R Grayson, 331 Pine
Challenge Con M Co, Nev	23	10c	May 13	June 16..July 8	C L McCoy, Mills Bldg
Chollar M Co, Nevada	43	15c	May 10	June 15..July 8	C E Elliott, 309 Montgomery
Gold Hill M Co, Cal	12	25c	June 16	July 26..Aug 12	C A Grow, Mills Building
Jamison M Co, Cal	9	5c	Nov 27	June 23..Aug 18	Sam W Cheyney, 120 Sutter
Occidental Con M Co, Nev	27	10c	May 11	June 12..July 1	Alfred K Durbrow, 309 Montgomery
Pine Hill G & S M Co, Cal	10	5c	May 10	July 1..July 22	Chas A Hare, 1003 Railroad Ave
Rock Island G & S M Co, Nev	14	2c	May 20	June 25..July 6	W W Guptill, 309 Montgomery
Thorpe M Co, Cal	7	2½c	June 9	July 17..Aug 9	A F Frey, Phelan Building

WILL NEGOTIATE with owners or their duly authorized agents only.

WILL INVESTIGATE only thoroughly bona-fide properties, either Mines, Prospects or Mineral Lands, whose owners are willing to make reasonable terms. When sending reports on properties also send terms on which you are willing to sell or lease.

E. N. BREITUNG,
Marquette, Mich., U. S. A.
Operator and Dealer in
Mines, Mining Properties and Mineral Lands,
Mining Stocks, Bonds, Options, Leases, Contracts and Securities.

MONEY LOANED ON BONA-FIDE MINES.

WILL EXAMINE on reasonable terms all kinds of Mines, Mining Properties and Mineral Lands as to their value, method of working and the condition of their titles.

WILL GIVE Options, Leases, Bonds and Contracts on all kinds of Mines, Mining Properties and Mineral Lands.

Assay and Chemical Work Done on Reasonable Terms.

Have best of bank and other references. Use McNeill's or A B C Telegraphic Codes.

DO ALL OUR OWN EXPERT AND CHEMICAL WORK.

THOMAS J. FRY, President. JOHN SYLVANUS, Sec'y & Treas.
T. R. MILLER, Vice-Pres't. JOHN D. FLEMING, Counsel.

CAPITAL STOCK, $100,000.

THE Mining Investment Company,
No. 521 to 524 Cooper Building,
DENVER, COLO.
Branch Office, - COLORADO SPRINGS.

Gold and Copper Properties Wanted. We have prospective purchasers for developed and producing mines and desire to correspond direct with owners of such properties. We handle properties on legitimate commission only and prefer to deal with owner or authorized representatives.

WANTED.—An Assay Outfit
IN GOOD CONDITION.
Address JOHN G. SMITH, 474 Edwards Street, Oakland, Cal.

WANTED.

Competent Assayers and Chemists and Experienced Ore Samplers,

To take charge of our branch offices in the Republic of Mexico, through which we purchase Ores, Bullion and Sulphides, and sell Mining and Milling Supplies. Must be thorough, active and careful workers. Knowledge of Spanish desirable. Address, with references, THE LEWIS COMPANY, Apartado 71 B, Mexico City.

WANTED.

Old Iron Shafting,
5 to 15 in. Diameter.
Address "IRON," Mining and Scientific Press.

DIVIDEND NOTICE.

The German Savings and Loan SOCIETY,
526 California Street.

For the half year ending June 30, 1897, a dividend has been declared at the rate of four and twenty-hundredths (4.20) per cent per annum on Term Deposits and three and fifty-hundredths (3.50) per cent per annum on Ordinary Deposits, free of taxes, payable on and after THURSDAY, July 1st, 1897. GEO. TOURNY, Secretary.

DIVIDEND NOTICE.

San Francisco Savings Union,
532 California Street, Corner Webb.

For the half year ending with the 30th of June, 1897, a dividend has been declared at the rate per annum of four and two-tenths (4.2) per cent on Term Deposits and three and five tenths (3.5) per cent on Ordinary Deposits, free of taxes, payable on and after THURSDAY, July 1st, 1897.
LOVELL WHITE, Cashier.

$33,014,000
Paid in Dividends by Utah Mining Stocks.
Weekly Market Letter on Application.
Quotations by Wire or Mail.
JAMES A. POLLOCK, Mining Stock Broker,
SALT LAKE CITY, UTAH.

STOCK IN THE
Copper King of Arizona
Can be had by applying to
C. W. BLACKBURN, Fiscal Agent,
BISBEE, ARIZONA.
Send for prospectus.

British Columbia.
E. S. TOPPING, TRAIL, B. C.,
Has prospects for sale in Trail Creek and the whole of the Columbia basin. Will buy legitimate stock and mines for investors. Will examine mines. Has lots for sale in Trail and Deer Park.

The right of the advertiser to know the measure of his purchase in circulation is no less than the right of the publisher to know the weight of print paper received from the mill.

the ton. In Occidental they are still actively prosecuting work on the 550-foot and 650-foot levels, with as yet indifferent success.

The following illustrates the changes of the week:

MINES.	June 17.	June 24.
Alpha		
Alta Consolidated	$ 02	
Andes	14	
Belcher	18	
Best & Belcher	48	
Bodie		
Bullion		
Challenge		
Chollar	91	$ 75
Confidence		
Consolidated California and Virginia	1 55	1 40
Consolidated New York		
Crown Point		
Exchequer		
Gould & Curry	35	31
Hale & Norcross	77	
Justice		
Mexican	29	26
Ophir	74	63
Overman	10	
Potosi	54	36
Savage	25	22
Sierra Nevada	51	53
Union	35	
Utah		
Yellow Jacket	28	32

San Francisco Stock Board Sales.

SAN FRANCISCO, June 24, 1897.

9:30 A. M. SESSION.

200 Challenge	39	200 Ophir	63
450 Chollar	75	300 Potosi	39
50 Con Cal & Va	1 40	50 Sierra Nevada	53
100 Gould & Curry	31	100 Standard	1 40

SECOND SESSION—2:30 P. M.

50 Mexican	26	500 Yellow Jacket	32
100 Best & Belcher	39	100 Sierra Nevada	51
300 Con Cal & Va	1 35	300 Overman	09
450 Chollar	75	300 Challenge	39
550 Potosi	36	100 Savage	22

List of U. S. Patents for Pacific Coast Inventors.

Reported by Dewey & Co., Pioneer Patent Solicitors for Pacific Coast.

FOR THE WEEK ENDING JUNE 15, 1897.

584,450.—STATION INDICATOR—M. Anthony, Oakland, Cal.

584,662.—BICYCLE PANNIER—E. C. Bartlett, S. F.

584,494.—VOTING MACHINE—C. Christensen, Oakland, Cal.

584,673.—SPACING MACHINE—J. H. Crawford, S. F.

584,331.—CAR VENTILATOR—W. Curlett, S. F.

584,489.—BROOM CORN SIZER—Gaffney & Fischer, S. F.

584,401.—CONCENTRATOR BELT—Geo. Gates, Jackson, Cal.

584,402.—BELT ADJUSTMENT—Geo. Gates, Jackson, Cal.

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584,508.—TOOL FOR CLEANING SEWERS—J. S. Hughes, Lebanon, Or.

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In the Superior Court of the City and County of San Francisco, State of California. Department No. 8. John V. Kimball, plaintiff, vs. Mabel L. Kimball, defendant. Action brought in the Superior Court, City and County of San Francisco, State of California, and the complaint filed in said City and County of San Francisco, in the office of the clerk of said Superior Court. The people of the State of California send greeting to Mabel L. Kimball, defendant. You are hereby required to appear in an action brought against you by the above-named plaintiff in the Superior Court, City and County of San Francisco, State of California, and to answer the complaint filed therein within ten days (exclusive of the day of service) after the service on you of this summons, if served within this county; or, if served elsewhere, within thirty days. The said action is brought to dissolve the bands of matrimony now existing between yourself and plaintiff, on the ground of habitual intemperance on your part for more than one year past. All of which will more fully appear in the complaint on file herein to which you are hereby referred. And you are hereby notified that if you fail to appear and answer the said complaint, as above required, the said plaintiff will apply to the said Court for the relief prayed for in the complaint. Given under my hand and seal of said Superior Court at the City and County of San Francisco, State of California, this 9th day of April, in the year of our Lord, one thousand eight hundred and ninety-seven. C. F. Curry, Clerk. By Joseph Riordan, Deputy Clerk. R. Thompson, Attorney for Plaintiff.

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